SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

Object Oriented Programming with JAVA
CODE: 2305501
B.E. 5th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
4	-	4	8	6	30	50	70	-	150

Objective: To understand the concept of object oriented programming. This course Provide fundamental knowledge of the various aspects of java programming and enables students to appreciate recent development in the area.

Prerequisite: Object Oriented Concepts

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	**Basics of JAVA:** Features of Java, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Control Statements – If , else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue.,	03
2	**Array and String:** Single and Multidimensional Array, String class, String Buffer class, Operations on string, Command line argument, Use of Wrapper Class.	04
3	**Classes, Objects and Methods:** Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static	06

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	keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class ,Abstract class.	
4	**Inheritance and Interfaces:** Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance,method overriding, super keyword ,Final keyword, Creation and Implementation of an interface , instanceof operator, Interface inheritance, Dynamic method dispatch ,Comparison between Abstract Class and interface	06
5	**Package:** Use of Package, CLASSPATH, Import statement, Static import, Access control	04
6	**Exception Handling:** Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class	05
7	**Multithreaded Programming:** Use of Multithread programming, Thread class and Runnable interface , Thread priority, Thread synchronization , .Thread communication,Deadlock	05
8	**IO Programming:** Introduction to Stream, Byte Stream, Character stream, Readers and Writers, File Class, File InputStream, File OutputStream, InputStreamReader,OutputStreamWriter,FileReader, FileWriter, BufferReader	05
9	**Collection Classes :** List, Abstract List, Array List, Linked List, Enumeration, Vector, Properties, Introduction to java.util package.	05
10	**Networking with java.net:** InetAddress class ,Socket class, Datagram Socket class, Datagram Packet class	05

Learning Outcomes:

After successful completion of the course students should be able to:

1. Understand object oriented programming concepts and implement in java.
2. Compare building blocks of OOPs language, inheritance, package and interfaces.
3. Identify exception handling methods.
4. Implement multithreading in object oriented programs.

Teaching & Learning Methodology:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures
- Experiments shall be performed in the laboratory related to course contents

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Books Recommended:

1. Java Fundamentals A comprehensive introduction By Herbert Schildt, Dale Skrien, McGraw Hill Education.
2. Programming with Java A Primer – E.Balagurusamy, McGraw hill Education.
3. The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, - TMH.
4. Programming with Java, M. P. Bhave S.A. Patekar, Pearson.
5. Introduction to Java Programming 7th ed., Y. Daniel Liang, Pearson.

E-Resources:

1. Java Development Kit:
   http://www.oracle.com/technetwork/java/javase/downloads/index.html
2. http://docs.oracle.com/javase/specs/jls/se7/html/index.html
3. http://docs.oracle.com/javase/tutorial/java/index.html
4. http://www.javatpoint.com/
5. http://www.tutorialspoint.com/java/
6. http://www.learnjavaonline.org/
7. http://www.c4learn.com/javaprogramming/
8. http://www.learn-java-tutorial.com/

Practical List:

Sr. No.	Practical
1.	Display greatest number from three numbers.
2.	To check given number is prime or not.
3.	To reverse the given number.
4.	Display Fibonacci series.
5.	To print given pattern on screen. 1 2 3 4 3 2 1 1 2 3 3 2 1 1 2 2 1 1 1
6.	To search an element from an array.
7.	Sort the array in ascending order.
8.	Multiplication of 3X3 matrices.

9.	Create a class Calculator with arithmetic functions such as addition, subtraction, multiplication, and division.
10.	Create a class Time with hours, minutes, and seconds as member variables and calculate sum of two Time objects.
11.	Create a class named Student. Create a class named Test .To calculate mark of students create other class Result which is inherited from Student and Test.
12.	Create a class which can perform following tasks using method overloading a) Addition of two float values b) Addition of two arrays. c) Addition of two Strings
13.	Write an OOP to demonstrate use of following functions of String class 1) getChars() 2) equals() 3) equalsIgnoreCase() 4) startsWith() 5) endsWith() 6) subString()
14.	Write an OOP to demonstrate use of following functions of StringBuffer class 1) deleteCharAt() 2) insert()
15.	Write an OOP to sort list of strings in alphabetical order.
16.	To catch Arithmetic Exception such as division by zero
17.	To catch multiple exceptions such as ArrayIndexOutOfBoundsException, NumberFormatException, NullPointerException.
18.	Write an OOP To throw your own exception
19.	Write an OOP for copying character from one file to another.
20.	Write an OOP for writing bytes to file
21.	Write an OOP for reading bytes from a file
22.	Write an OOP for copying bytes from one file to another.
23.	Write an OOP for reading and writing primitive datatype.
24.	Write an OOP for reading and writing using a random access file.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

Theory of Computation
CODE: 23040502
B.E. 5th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	1	-	4	3.5	30	50	70	-	150

Objective: The objective of this course is to provide students with an understanding of basic concepts in the theory of computation. At the end of this course students will:

- Be able to construct finite state machines and the equivalent regular expressions.
- Be able to prove the equivalence of languages described by finite state machines and regular expressions.
- Be able to construct pushdown automata and the equivalent context free grammars.
- Be able to prove the equivalence of languages described by pushdown automata and context free grammars.
- Be able to construct Turing machines and Post machines.
- Be able to prove the equivalence of languages described by Turing machines and Post machines.

Prerequisite: Calculus and Data Structures and Algorithms

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	**Review of Mathematical Terms and Theory:** Sets, Functions, Logical statements, Proofs, relations, languages, Mathematical induction, strong principle, Recursive definitions	6

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2	**Regular Languages and Finite Automata:** Regular language and regular expressions, Deterministic finite automata, Minimization of finite automata, Operations on Finite automata, Nondeterministic Finite Automata, Conversion of NFA to DFA, NFA-^, Conversion of NFA-^ to NFA and DFA, Kleene's Theorem, Pumping lemma for regular Languages.	10
3	**Context Free Grammar (CFG):** Introduction to CFG, Derivation and Parse Tree, Ambiguity in CFG, Left factoring and Left Recursion, Simplification of CFG, Linear Grammar, Normal Forms (GNF and CNF), Applications of CFG	6
4	**Push-Down Automata (PDA):** Introduction of PDA, DPDA and NPDA, Construction of PDA from CFG and vice versa	6
5	**Turing Machines (TM):** Introduction to TM, Variations of TM, Non deterministic TM, Universal TM, Two Stack PDA and Turing machine.	6
6	**Recursive Functions and Computational Complexity:** Post Correspondence Problem, Initial Function, Recursive Function, and Gödel Number, Types of complexity, Different Notations, Complexity Classes, P and NP problems, and Polynomial time reducibility.	6

Learning Outcomes:

After learning the course the students should be able to:

1. Understand the basic concepts and application of Theory of Computation.
2. Apply this basic knowledge of Theory of Computation in the computer field to solve computational problems and also in the field of compilers.

Teaching & Learning Methodology:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.

Books Recommended:

1. Introduction to languages and Theory Of Computation by John C. Martin, Third Edition, TMH Publication.
2. Introduction to Automata theory, Formal Languages and Computations by Shyamalendu Kandar, Pearson Publication.

E-Resources:

- https://www.geeksforgeeks.org/toc-introduction-theory-computation/
- https://nptel.ac.in/courses/106104028/
- http://www.contrib.andrew.cmu.edu/~lamuslar/TheoryofComputation.html

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

Information Network and Cyber Security
CODE: 2304503
B.E. 5th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objective: To provide an understanding of principal concepts, major issues, technologies and basic approaches in information security. Gain familiarity with prevalent network and distributed system attacks, defenses against them and forensics to investigate the aftermath.

Prerequisites: - Operating System and Computer Network

Course Outline:-

Sr. No.	Course Contents	Number of Hours
1	Symmetric Cipher Model, Cryptography, Cryptanalysis and Attacks; Substitution and Transposition techniques, Public and Private key cryptography	06
2	Stream ciphers and block ciphers, Block Cipher structure, Data Encryption standard (DES), AES with structure, its transformation functions, Cipher Block Chaining Mode	06
3	RSA algorithm, Diffie-Hillman Key Exchange algorithm, MIME	05
4	Simple hash functions, its requirements and security, Hash functions	05
5	Digital Signature, Key management and distribution, Web Security and SSL	05
6	Systems Vulnerability Scanning, Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall	05
7	Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow.	07

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Learning Outcomes:

After successful completion of the course students should be able to:

1. Understand and apply the various symmetric and Asymmetric key algorithms.
2. Understand the concepts of hashing with algorithms and Digital Signature.
3. Understand cyber-attack, types of cybercrimes also how to protect them self and ultimately society from such attacks
4. To get Knowledge of Cyber security Tools.

Teaching & Learning Methodology:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Books Recommended:

1. Cryptography and Network Security, Principles and Practice Sixth Edition, William Stallings, Pearson.
2. Cryptography and Network Security Atul Kahate, TMH
3. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication McGraw Hill.

E-Resources:

1. Software: cryptool (www.cryptool.org)
2. Software: Wireshark (www.wireshark.org)
3. https://www.owasp.org/index.php/Category:OWASP_Top_Ten_Project

Practical List:

Sr. No.	Practical
1	Implement Caesar cipher encryption-decryption.
2	Implement Polyalphabetic cipher encryption-decryption.
3	Write a program to generate SHA-1 hash.
4	Study and use the Wireshark for the various network protocols.
5	TCP scanning using NMAP
6	Port scanning using NMAP
7	Web application testing using DVWA
8	Manual SQL injection using DVWA

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

WEB TECHNOLOGY

CODE: 2340504
B.E 5th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives:

To cover the basics of Web designing using technologies like HTML, CSS, and JavaScript. Students should be capable to create static and dynamic web pages.

Prerequisites:

Students should have basic knowledge of internet and web-browser.

Course outline:

Sr. No.	Course Contents	Number of Hours
1	**Introduction** : Concept of WWW, Internet and WWW, HTTP Protocol : Request and Response, Web browser and Web servers, Features of Web 2.0, Web Design: Concepts of effective web design, Web design issues, Planning and publishing website, Designing effective navigation	7
2	**HTML:** Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists (Ordered and Unordered), tables, images XHTML, Meta tags.	6
3	**HTML:** Character entities, frames and frame sets, Browser architecture and Web site structure.	6

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4	**HTML:** HTML Forms (Text, Text Area, Radio Button, Checkbox, Dropdown menu, Submit Button). Overview and features of HTML5, HTML 5 : (Introduction, New Elements, Semantics)	6
5	**Style sheets** : Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of CSS3	8
6	**JavaScript:** Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes.	6

Learning Outcomes:

After successful completion of this course, student will be able to

- Understand the basic structure of web designing technology.
- Apply the concepts of web technology in designing static and dynamic web pages.
- Design interactive web pages incorporating validation techniques.

Teaching & Learning Methodology:

For teaching Web Technology notepad or notepad++, Dreamweaver or Netbeans software will be used. To perform practical experiments any web browser (Internet Explorer, Mozilla Firefox, Google chrome) etc. will be used.

Books Recommended:

1. Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India.
2. Web Technologies, Black Book, Dreamtech Press.
3. HTML 5, Black Book, Dreamtech Press.
4. Web Design, Joel Sklar, Cengage Learning.
5. Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel, Pearson.

E-Resources:

Server software XAMPP/WAMP/LAMP

www.apachefriends.org
www.w3.org
www.w3schools.com

Practical List:

Sr. No.	Practicals
1	Study practical of www.
2	Make a Web page Using some basic HTML Tags(Heading,Line break,Horizontal ruler, marquee ,Link)
3	Write a program to using List (Ordered list & unordered list).
4	Write a program to display a table.(use cell padding , cell spacing, row span and col span tags)
5	Make a web page with use of frame and take atleast 5 frames in one page.
6	Using form tag generate registration form.
7	Write a program for JavaScript to find even and odd number.
8	Write a program for JavaScript to reverse number.
9	Write a program for Switch case using JavaScript.
10	Write a program to find maximum of 3 numbers using JavaScript.
11	Write a program to find square and cube using JavaScript.
12	Write a program for pop-up boxes using JavaScript.
13	Make a program for types of CSS.(inline , Document level, external)
14	Write a program using JavaScript. When you press on button background color will change.
15	Write a program using JavaScript. (a) Print alert message using onload event. (b) Print alert message using onclick event. (c) Print alert message using double click event.
16	Write a program using JavaScript, when you click on radio button message will be display.
17	Write a program using JavaScript to verify your password.

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SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

Computer Maintenance & Troubleshooting
CODE: 2304050503
B.E. 5th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives:

Students will able to Install, configure Operating Systems and device drivers, components of peripheral devices also repair and maintain the system.

Prerequisites:

Student must have a working knowledge of computer basics.

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	**Identify different type and generation of computer**, Identify devices required for using laptops, Identify components which makes the system and specify its importance. Identify various types of ports and its connecting devices. Motherboard: definition, Components/connections in motherboard, functional block diagram.	05
2	**Central Processing Unit (CPU):** CPU Speeds, Word Size, Data Path, Internal Cache memory, Slots and sockets, CISC vs RISC processor, CPU chips preprocessors motherboard Types/Form Factors (AT, Baby AT, ATX, LPX).	05

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3	**Basic Input Output System**: Services, BIOS Interaction, CMOS RAM, Chipsets : Definition, Advantage, North and South Bridge, System Memory : definition, memory sizes, speeds and shapes (DIP, ZIP,SIPP, SIMM, DIMM, RIMM),Memory modules (Dynamic RAM,SDRAM, DDR SDRAM, SLDRAM, Fast Page Mode (FPM)DRAM, Extended Data Out(EDO)DRAM)	06
4	**Disk Basics**: Hard Disk Interfaces, IDE, Serial ATA, SCSI, USB and IEEE 1394 (Firewire), RAID, Solid State Drive(laptop)Disk Geometry : Heads, Tracks, Sectors, Cylinders, Cluster, Landing zone, MBR, Zone bit recording Disk performance Characteristics: Seeks and Latency, Data Transfer Rate	06
5	**Keyboard**: Keyboard operation, Keyboard Types, Types of Key switches (Membrane, mechanical, rubber dome, capacitive), Keyboard interfaces, Mouse : Types, Operation, Interfaces, Scanner : Scanner Types, Image quality measurement, Working **Printers** : Types of Printers, Printer Interfaces, Ink-jet Printer : Parts, working principle, LaserJet Printer : Parts, Working principle	07
6	**Video Basics**: (CRT parameters) VGA monitors, Digital Display Technology- Thin Displays, Liquid Crystal Displays, Light Emitting Displays, Graphics Cards : Components of a card, Accelerated Video cards, CGA, EGA, VGA	05
7	**POST** : Functions, IPL Hardware, Test Sequence, Error messages **Troubleshooting** : possible problems and diagnosis Motherboard, Keyboard, Hard Disk Drive, Printer **Preventive maintenance Tools**	05

Learning Outcomes:

Students can assemble and disassemble the computer system and peripherals. Student can troubleshoot and repair the computer system and peripherals.

Teaching & Learning Methodology:

At first preliminary introduction will be given to all students about the different parts and peripheral devices of the computer. Practical related to different peripheral and devices networking and troubleshooting will be done.

Books Recommended:

1. Computer Installation and Servicing D. Balasubramanian, Tata McGraw Hill
2. The complete PC Upgrade & Maintenance Guide Mark Minasi, BPB Publications
3. IBM PC and clones Govind Rajalu, Tata McGraw Hill

E-Resources:

1) https://edu.gcfglobal.org/en/computerbasics/basic-troubleshooting-techniques/1/
2) https://www.computerhope.com/issues/ch000248.htm
3) https://computer.howstuffworks.com/computer-hardware-channel.htm

Practical List:

1.	Indentify Basic terms, Components and Function of a Personal Computer
2.	Identify Common Peripheral ports, associated cables and their connectors
3.	Identify Major Components of Motherboard
4.	Assemble and Disassemble the Desktop PC
5.	Hard Disk Drive Components and Interfaces
6.	Hard Disk Formatting
7.	Operating System Setup and Installations
8.	Observe the power supply (SMPS) and measure their voltage levels of a given PC.
9.	Observe and write steps to troubleshoot, maintain and clean the diskette drives, keyboard, mouse, etc.
10.	Install driver and interface the printers with PC/Laptop
11.	Install driver and interface the Scanner, Projector with PC/Laptop
12.	System maintenance &troubleshooting.
13.	Download and install Device driver software from internet.

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SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

Computer Graphics & Visualization

CODE: 2304o506

B.E. 5th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives: The goal of this course is to provide an introduction to the theory, algorithms and concepts of computer graphics.

Prerequisites: Student should have programming knowledge of C/C++. Familiarity with the concepts of mathematics like coordinate geometry and algebra is required.

Course outline:

Sr. No.	Course Contents	Number of Hours
1	**Introduction to Graphics:** Applications, graphics input devices, display devices (CRT, Color CRT Monitors, DVST and Flat Panel Displays), Introduction to Raster & Random Scan display, graphics s/w and standards.	06
2	**Output Primitives:** Scan Conversion: Point, Line, Circle and ellipse (algorithms). Introduction to Aliasing and Anti Aliasing.	08

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3	**Filled area primitives:** Polygon Drawing, Types of polygon, Inside outside test (Odd-Even rule, winding number), Scan line polygon filling, Boundary fill, Flood fill.	08
4	**2D Transformation and Viewing: :** Basic Transformation: Translation, scaling, rotation, matrix representation, homogeneous coordinates, composite transformations Other transformation: Shear, Reflection, Viewing and Clipping: Viewing pipeline and Coordinates system, Window to viewport coordinate transformation, Point Clipping, Line Clipping: (Cohen-Sutherland, Liang-barsky, NLN), Polygon Clipping: Sutherland-Hodgeman Polygon Clipping and Weiler Atherton Polygon Clipping.	10
5	**Advanced topics :** Visible surface detection method: Back-face detection, Depth buffer Method, Scan line, Depth sorting. Light Rendering: Basic illumination model, Diffuse reflection, Specular reflection, Phong shading, Gouraud shading, Color models like RGB, YIQ, CMY, HSV.	08

Learning Outcomes:

Students should be able to know the working of input-output devices. They should know the basics of object drawing. Students should be able to understand and implement different algorithms used to draw geometrical shapes in graphics. Understand the basic knowledge of co-ordinates and clipping algorithms.

Teaching & Learning Methodology:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.

2. The course includes a laboratory, where students have an opportunity to build an application for the concepts being taught in lectures

3. Experiments shall be performed in the laboratory related to course contents

Books Recommended:

1. Donald Hearn and M. Pauline Baker, Computer Graphics- C Version, PHI/Pearson Education
2. J. D. Foley, S. K Feiner, A Van Dam F. H John, Computer Graphics: Principles & Practice in C, Pearson Education

Practical List:

Sr. No.	Practical
1	Write a program to draw Smiley using language C
2	Write a program to DDA Line Drawing Algorithm
3	Write a program to Bresenham's Line Drawing Algorithm
4	Write a program to Midpoint Circle Algorithm
5	Write a program to Midpoint ellipse Algorithm.
6	Write a program to 2D Translation Triangle Program.
7	Write a program to 2D Rotation of Triangle Program.
8	Write a program to 2D Scaling Triangle Program.
9	Write a program to draw a moving person.
10	Project I (e.g. Screensaver, Moving Ship etc.)

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

IMAGE PROCESSING

CODE: 23040507

B.E.: 5th Semester

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives:

To understand the image fundamentals and mathematical transforms that is necessary for image processing. Students should know about the different techniques of image enhancement and restoration procedures. By studying this course, students should be familiar with image compression procedures.

Prerequisites:

Digital Signal Processing, Transform techniques.

Course outline:

Sr. No.	Course Contents	Number of Hours
1	**Introduction and Digital Image Fundamentals** Digital Image Fundamentals, Human visual system, Image as a 2D data, Image representation – Gray scale and Color images, image sampling and quantization	6
2	Image enhancement in **Spatial domain:** Basic gray level Transformations, Histogram Processing Techniques, Spatial Filtering, Low pass filtering, High pass filtering	6

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3	**Image Restoration and Reconstruction:** Noise Models, Noise Reduction, Inverse Filtering, MMSE (Wiener) Filtering	6
4	**Color Image Processing:** Color Fundamentals, Color Models, Pseudo color image processing	4
5	**Image Compression:** Fundamentals of redundancies, Basic Compression Methods: Huffman coding, Arithmetic coding, LZW coding, JPEG Compression standard	6
6	**Morphological Image Processing:** Erosion, dilation, opening, closing, Basic Morphological Algorithms: 04 08 hole filling, connected components, thinning, skeletons	6
7	**Image Segmentation:** point, line and edge detection, Thresholding, Regions Based segmentation, Edge linking and boundary detection, Hough transform	6

Learning Outcomes:

After successful completion of this course, student will be able to

- Apply knowledge of mathematics for image understanding and analysis.
- Design and analysis of techniques / processes for image understanding.
- Design, realize and troubleshoot various algorithms for image processing case studies.

Teaching & Learning Methodology:

For teaching this subject MATLAB will be used with projector in computer lab.

Books Recommended:

1. Gonzalez & Woods, —Digital Image Processing , 3rd ed., Pearson education, 2008
2. Jain Anil K., —Fundamentals Digital Image Processing , Prentice Hall India, 2010
3. Milan Sonka, Vaclav Hlavav, Roger Boyle, —Image Processing, Analysis and Machine Vision , 2nd ed.,Thomson Learning, 2001
4. Rangaraj M. Rangayyan, —Biomedical Image Analysis , CRC Press, 2005
5. Pratt W.K, —Digital Image Processing , 3rd ed., John Wiley & Sons, 2007

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Practical List:

Sr. No.	Practical
1	Introduction to Image Processing Toolbox.
2	To create a program to display grayscale image using read and write operation.
3	To create a program to rotate an image.
4	To create a vision program to find histogram value and display histograph of a grayscale and color image.
5	To create a vision program to determine the edge detection of an image using different operators.
6	To create a program to eliminate the high frequency components of an image.
7	To create a color image and perform read and write operation.
8	To obtain the R,G,B color values and resolved color values from a color box by choosing any color.
9	To create a program for segmentation of an image using watershed transforms.
10	Implement Image compression using DCT Transform.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

WIRELESS NETWORK

CODE : 2302060l

DEGREE: 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives:

Introduction to planning and design of wireless networks.Introduction to HSPA systems.To study emerging technologies like Bluetooth, Zigbee, Wimax. Understanding the wireless sensor network architecture and the protocol stack and WSN applications

Prerequisites:

Students need to understand the Computer Communication and Network as well as Mobile Communication before learning this syllabus.

Course outline:

Sr. No.	Course Contents	Number of Hours
1	**INTRODUCTION:** Evolution of mobile communications, Mobile Radio System around the world, Types of Wireless communication System, Comparison of Common wireless system, Trend in Cellular radio and personal communication. Second generation Cellular Networks, Third Generation (3G) Wireless Networks , Wireless Local Loop(WLL),Wireless Local Area network(WLAN), Bluetooth and Personal Area Networks.	5
2	**TRANSMISSION FUNDAMENTALS:** Signals for Conveying Information, Analog and Digital Data Transmission, Channel Capacity, Transmission Media, Multiplexing.	8

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	COMMUNICATION NETWORKS: LANs, MANs and WANs, Switching Techniques, Circuit Switching, Packet Switching **MODULATION TECHNIQUES:** Signal Encoding Criteria, Digital Data- Analog Signals, Analog Data-Analog Signals, Analog Data-Digital Signals **SPREAD SPRECTRUM:** The Concept of Spread Spectrum, Frequency Hopping Spread Spectrum, Direct Sequence Spread Spectrum, Code Division Multiple Access.	
3	**MULTIPLE ACCESS IN WIRELESS SYSTEMS:** Multiple access scheme, frequency division multiple access, Time division multiple access, code division multiple access, space division multiple access, packet radio access, multiple access with collision avoidance.	5
4	**GLOBAL SYSTEM FOR MOBILE COMMUNICATION (GSM):** Global system for mobile communication, GSM architecture, GSM entities, call routing in GSM,PLMN interface, GSM addresses and identifiers, network aspects in GSM,GSM frequency allocation, authentication and security	6
5	**GENERAL PACKET RADIO SERVICE (GPRS):** GPRS and packet data network, GPRS network architecture, GPRS network operation, data services in GPRS, Applications of GPRS, Billing and charging in GPRS.	6
6	**BLUETOOTH:** Radio specification, baseband specification, link manager specification, logical link control and adaption protocol	3
7	**ZigBee:** Components, architecture, network topologies, protocol stack	3
8	**UWB and RFID:** Technical requirements, components and characteristics, applications **WiMAX:** 802.16 based protocol architecture, physical layer, fixed and mobile WiMAX	3

Learning Outcomes:

- Describe the phases of planning and design of mobile wireless networks.
- List and compare personal area network (PAN) technologies such as Zigbee, Bluetooth etc.
- Students will details of sensor network architecture, traffic related protocols, transmission technology etc.
- Knowledge of GSM, GPRS (1G/2G, 2.5G technologies).

Teaching & Learning Methodology:

Students will learn about concepts and practical implementation of Amplitude, Phase and Frequency modulation kit and Advanced AM/FM signal generator, GSM and CDMA trainer kit.

Books Recommended:

1. Computer Networks and Internets- Douglas E Comer—Pearson –5 th edition.
2. Internetworking with TCP/IP -- Douglas E Comer—Pearson –5th edition.
3. Wireless Communications & Networks, Second Edition, William Stallings by Pearson
4. Mobile Computing Technology, Applications and Service Creation , Asoke K Telukder, Roopa R Yavagal by TMH
5. Wireless and Mobile Networks, Dr. Sunilkumar S. Manvi, Dr. MahabaleshwarS. Kakkasageri by WILEY.

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E-Resources:

https://www.tutorialspoint.com/gsm/gsm_architecture.htm
https://www.tutorialspoint.com/gprs/gprs_architecture.htm
https://www.techopedia.com/2/29090/networks/lanwanman-an-overview-of-network-types
http://www.swiftutors.com/bluetooth-introduction.html
https://www.elprocus.com/what-is-zigbee-technology-architecture-and-its-applications/

Practical List:

Sr. No.	Practical
1	Study practical of Wireless networks.
2	Prepare a wireless ad hoc network and show its working.
3	Study practical of GSM.
4	Study practical of GPRS.
5	Study practical for Bluetooth and ZigBee.
6	Write a program that identifies the Bluetooth devices in the wireless range
7	Write a program to perform Bluetooth file transfer.

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SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

COMPILER DESIGN

CODE: 2304060 2

B.E. 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives:

Understand the compilation process and its phases. To give students clear idea about various phases of Compiler, Structuring and optimizing into phases of a Compiler. Different types of Grammar, Finite state machines, lex, YACC and related concepts of languages are also major objectives.

Prerequisite: Data Structures and Algorithms and Theory of Computation

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	**Introduction:** Overview of the Translation Process, A Simple Compiler, Difference between interpreter, assembler and compiler. Overview and use of linker and loader, types of Compiler, Analysis of the Source Program, The Phases of a Compiler, Cousins of the Compiler, The Grouping of Phases, Lexical Analysis, Hard Coding and Automatic Generation Lexical Analyzers, Front-end and Back-end of compiler, pass structure.	05
2	**Lexical Analyzer:** Introduction to Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, A Language for Specifying Lexical Analyzers, Finite Automata From a Regular Expression, Design of a Lexical Analyzer Generator, Optimization of DFA.	06

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3	**Parsing Theory:** Top Down and Bottom up Parsing Algorithms, Top-Down Parsing, Bottom-Up Parsing, Operator Precedence Parsing, LR Parsers, Using Ambiguous Grammars, Parser Generators, Automatic Generation of Parsers. Syntax-Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, and syntax directed definitions and translation schemes.	07
4	**Error Recovery:** Error Detection & Recovery, Ad-Hoc and Systematic Methods	04
5	**Intermediate Code Generation:** Different Intermediate Forms, Syntax Directed Translation Mechanisms And Attributed Mechanisms And Attributed Definition.	04
6	**Run Time Memory Management:** Source Language Issues, Storage Organization, Storage-Allocation Strategies, and Access to Non local Names, Parameter Passing, Symbol Tables, and Language Facilities for Dynamic Storage Allocation, Dynamic Storage Allocation Techniques.	05
7	**Code Optimization:** Global Data Flow Analysis, A Few Selected Optimizations like Command Sub Expression Removal, Loop Invariant Code Motion, Strength Reduction etc.	02
8	**Code Generation:** Issues in the Design of a Code Generator, The Target Machine, Run-Time Storage Management, Basic Blocks and Flow Graphs, Next-Use Information, A Simple Code Generator, Register Allocation and Assignment, The DAG Representation of Basic Blocks, Peephole Optimization, Generating Code from DAGs, Dynamic Programming Code-Generation Algorithm, Code-Generator Generators.	06

Learning Outcomes:

On successful completion of this subject content, the student should:

- To study the design and implementation of assemblers.
- To study the design and implementation of compilers.
- To know the design and implementation of linkers and loaders.
- To have an understanding of macro preprocessors.
- To have an understanding of system software tools.

Teaching & Learning Methodology:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- The course includes a laboratory of lenux, where students have an opportunity to build an appreciation for the concepts being taught in lectures
- Experiments shall be performed in the laboratory related to course contents

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Books Recommended:

1. Compilers: Principles, Techniques and Tools ByAho, Lam, Sethi, and Ullman, Second Edition, Pearson 2014
2. Compiler Design in C By Allen I. Holub, Prentice-Hall/Pearson.

E-Resources:-

1. Nptel.ac.in
2. https://en.wikipedia.org/wiki/Principles_of_Compiler_Design
3. https://en.wikipedia.org/wiki/Compiler_construction

Practical List:-

Sr. No.	Practical
1	Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value. Simulate the same in C language
2	Write a C program to identify whether a given line is a comment or not
3	Write a C program to test whether a given identifier is valid or not.
4	Write a C program to simulate lexical analyzer for validating operators
5	To Study about Lexical Analyzer Generator(LEX) and Flex(Fast Lexical Analyzer)
6	Implement following programs using Lex. a. Create a Lexer to take input from text file and count no of characters, no. of lines & no. of words. b. Write a Lex program to count number of vowels and consonants in a given input string.
7	Implement following programs using Lex. a. Write a Lex program to print out all numbers from the given file. b. Write a Lex program to printout all HTML tags in file. c. Write a Lex program which adds line numbers to the given file and display the same onto the standard output
8	Write a Lex program to count the number of comment lines in a given C program. Also eliminate them and copy that program into separate file.
9	Write a C program for implementing the functionalities of predictive parser for the mini language.
10	Write a C program for constructing of LL (1) parsing.

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SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

Cloud Computing
CODE: 23040603
B.E. 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives: This course will help the students to get familiar with cloud computing fundamentals, architecture, services, implementation and deployment techniques etc.

Prerequisites: Fundamentals of Distributed Computing and Operating Systems

Course outline:

Sr. No.	Course Contents	Number of Hours
1	**Introduction to Cloud Computing:** Overview, Roots of Cloud Computing, Layers and Types of Cloud, Desired Features of a Cloud, Benefits and Disadvantages of Cloud Computing, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks.	06
2	**Cloud Architecture, Services and Applications:** Exploring the Cloud Computing Stack, Connecting to the Cloud, Infrastructure as a Service, Platform as a Service, Saas Vs. Paas, Using PaaS Application Frameworks, Software as a Service Cloud Deployment Models, Public vs Private Cloud, Cloud Solutions, Cloud ecosystem, Service management, Computing on demand, Identity as a Service, Compliance as a Service.	08

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3	**Abstraction and Virtualization:** Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hyper visors, Understanding Machine Imaging, Porting Applications, Virtual Machines Provisioning and Manageability Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action, Provisioning in the Cloud Context, Virtualization of CPU, Memory, I/O Devices, Virtual Clusters and Resource management, Virtualization for Data Center Automation.	07
4	**Cloud Infrastructure and Cloud Resource Management:** Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources. Administrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards	07
5	**Cloud Security:** Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Cloud computing security architecture: Architectural Considerations, General Issues Securing the Cloud, Securing Data, Data Security, Application Security, Virtual Machine Security	08
6	**Mobile Cloud Computing:** Introduction, Definition, Architecture, Benefits, challenges in mobile and at cloud shield	03

Learning Outcomes:

After completion of the course the student should be able to:

1. Differentiate different computing techniques.
2. Compare various cloud computing providers/ Software.
3. Handle Open Source Cloud Implementation and Administration.
4. Understand risks involved in cloud computing.

Teaching & Learning Methodology:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
2. The course includes a laboratory, where students have an opportunity to build an application for the concepts being taught in lectures
3. Experiments shall be performed in the laboratory related to course contents

Books Recommended:

1. Rajkumar Buyya et. el., Cloud Computing: Principles and Paradigms, Wiley India Edition
2. Distributed and Cloud Computing, Kai Hwang, Mk Publication
3. Cloud computing Black Book Dreamtech Publication
4. Sosinsky B., "Cloud Computing Bible", Wiley India
5. Mastering Cloud Computing by Rajkumar Buyya, C. Vecchiola& S. Thamarai Selvi McGRAW Hill
6. Miller Michael, "Cloud Computing: Web Based Applications that Change the Way You Work and Collaborate Online", Pearson Education India
7. Velte T., Velte A., Elsenpeter R., "Cloud Computing – A practical Approach", Tata McGrawHill

E-Resources:

1. http://www.njit.edu/education/pdf/academic-integrity-code.pdf
2. CloudSim 3.0.3
3. http://www.cloudbus.org/
4. https://aws.amazon.com/
5. http://aws.amazon.com/documentation/
6. http://docs.aws.amazon.com/IAM/latest/UserGuide/getting-started.html

Practical List:

Sr. No.	Practical
1	Sketch out and analyze architecture of Aneka / Eucalyptus / KVM identify different entities to understand the structure of it.
2	Create a scenario in Aneka / Eucalyptus to create a datacenter and host. Also create virtual machines with static configuration to run cloudlets on them.
3	Make and perform scenario to pause and resume the simulation in Aneka / Eucalyptus entity, and create simulation entities dynamically.
4	Organize a case in Aneka / Eucalyptus for simulation entities in run-time using a toolkit support and manage virtual cloud.
5	Sketch out and analyze architecture of Microsoft Azure.
6	Sketch out and analyze architecture of Amazon Web Service (AWS).
7	Categorize Microsoft Azure Services and discuss on each.
8	Categorize Amazon Web Service (AWS) and implement its various cloud entities using its Cloud Toolbox support
9	Implement and use sample cloud services with the help of Microsoft Azure.
10	Create a sample mobile application using Microsoft Azure account as a cloud service. Also provide database connectivity with implemented mobile application.

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

Data Mining and Warehousing

CODE: 2304604

B.E. 6th SEMESTER

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives: - This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts.

Prerequisites: - basic of Database Management System

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	Overview, Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.	07
2	Concept Description: Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central	06

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	Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi- Dimensional Association rules from Relational Databases	
3	What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbour classifiers, Genetic Algorithm. Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis	10
4	Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi-Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mining.	10
5	Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.	07

Learning Outcomes:-

After learning the course the students should be able to:

1. Students will be able to use mining tool.
2. Students are able to perform various data warehouse related exercise.

Teaching & Learning Methodology:-

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- Experiments shall be performed in the laboratory related to course contents
- Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work

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Books Recommended:-

1. Data Warehousing in the Real World – Anahory and Murray, Pearson Education.
2. Data Mining – Concepts and Technlques – Jlawal Han and Micheline Kamber.
3. Building the Data Warehouse – WH Inmon, Wiley.

E-Resources:-

1. NPTEL Online course

List of Experiments:-

Assignments based on above course content will be given to the students at the end of each chapter. Each assignment contains minimum 5 questions.

Quizzes and Surprise tests will be conducted for testing the knowledge of students for particular topic.

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SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

.NET Technology

CODE: 2304060S

B.E. 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	4	7	5	30	50	70	00	150

Objectives:

To get familiar with C# development using Visual Studio .NET and focuses on C# syntax, logic constructs, application development using windows forms, and the object-oriented nature of the language. Through the experience of creating these programs and methods the student will learn the fundamentals of C# programming.

Prerequisites:

Basic Knowledge of HTML, CSS, JavaScript and Web servers.

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	**Introduction :** • What is .NET? • What is the CLR? • The FCL • Primitive Types • Namespaces • Statements and Expressions • Operators	07

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2	**Classes and Objects:** • Constructors • Reference Types • Object Oriented Programming • Access Modifiers • Abstract Classes • Virtual Members • Static Classes • Debugging and Error Handling	04
3	**ADO.NET:** • Benefits of ADO.NET • ADO.NET compared to classic ADO • Datasets • Managed Providers • Data Binding: Introducing Data Source Controls • Reading and Write Data Using the Sql Data Source Control	04
4	**Windows Forms and Controls in details:** • The Windows Forms Model • Creating Windows Forms Windows Forms Properties and Events • Windows Form Controls, • Menus -Dialogs -ToolTips	04
5	**Visual Inheritance in C#.NET:** • Apply Inheritance techniques to Forms • Creating Base Forms • Programming Derived Forms	04
6	**Mastering Windows Forms:** • Printing - Handling Multiple Events • GDI+ • Creating Windows Forms Controls	04
7	**Themes and Master Pages:** • Creating a Consistent Web Site, • Themes - Master Pages • Displaying Data with the GridView Control Introducing the GridView Control • Filter Data in the GridView Control • Allow Users to Select from a DropDownList in the Grid • Add a Hyperlink to the Grid • Deleting a Row and Handling Errors	06
8	Managing **State:** • Preserving State in Web Applications and Page-Level State • Using Cookies to Preserve State • ASP.NET Session State • Storing Objects in Session State • Configuring Session State • Setting Up an Out-of-Process State Server • Storing Session State in SQL Server • Using Cookieless Session IDs • Application State, Using the DataList and Repeater Controls • Overview of List-Bound Controls • Creating a Repeater Control and DataList Control	06

Practical List:

Sr. No.	Practical
1	Write a program to check whether empty query string is entered in ASP .net
2	Write a program to change color of Label text control programmatically in ASP .Net
3	Write a program to Enable-Disable Textbox and change width of TextBox programmatically in Asp .Net
4	Write a program to increase and decrease font size programmatically.
5	Write C# code to display the asterisk pattern as shown below: ***** ***** ***** ***** *****
6	Write C# code to prompt a user to input his/her name and country name and then the output will be shown as an example below: Hello Ram from country India!
7	Write C# code to do the following - Convert binary to decimal - Convert decimal to hexadecimal - Convert decimal to binary - Convert decimal to octa
8	Write C# code to convert infix notation to postfix notation.
9	Write a C# code to convert digits to words
10	Write a C# code to Convert following currency conversion. Rupees to dollar, frank, euro.
11	Write a C# code to Perform Celsius to Fahrenheit Conversion and Fahrenheit to Celsius conversion.
12	Write ASP.Net program to Store Objects in Session State and Storing Session State in SQL Server.

Learning Outcomes:

Knowledge Outcome:

1. Articulate the basic syntax and features of the C# programming language
2. Define C# constructs which implement the three basic control structures
3. Define arithmetic, relational, and logical operators
4. Describe object-oriented (OO) concepts related to classes and objects
5. Describe the concepts behind sound user interface design
6. Describe the concepts behind variables, constants, and calculations

Skill Outcomes:

1. Demonstrate the ability to create Object-Oriented (OO) application programs
2. Demonstrate the ability to create appropriate classes and objects
3. Demonstrate the ability to create windows-based applications
4. Demonstrate the ability to create user interfaces including but not limited to various boxes, buttons, menus, dialog boxes

Teaching & Learning Methodology:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
2. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
3. Experiments shall be performed in the laboratory related to course contents.

Books Recommended:

1. Christian Nagel, Professional C# .Net, Wrox Publication
2. Matthew Macdonald and Robert Standefer, ASP.NET Complete Reference, TMH
3. Vijay Mukhi, C# The Basics, BPB Publications

E-Resources:

1. http://www.tarleton.edu/cis/studentresources.html
2. http://online.tarleton.edu/fac_dev/applications/student_blackboard/index.htm

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

Advance Java

CODE: 2304060 6

B.E. 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	4	7	5	30	50	70	-	150

Objectives:

To understand basic web application using JAVA and how to develop an applications in advance java technology. It introduce to developing web applications, advanced Java fundamentals, like JSP, Servlets, JDBC etc. it has good exposure to the object-oriented programming (OOP) concepts of Java language.

Prerequisites:

Object Oriented Programming Concepts, Knowledge of logical programming and core JAVA

Course outline:

Sr. No.	Course Contents	Number of Hours
1	Java Networking: Network Basics and Socket overview, TCP/IP client sockets, URL, TCP/IP server sockets, Datagrams, java.net package Socket, ServerSocket, InetAddress, URL, URLConnection	10
2	JDBC Programming : The JDBC Connectivity Model, Database Programming: Connecting to the Database, Creating a SQL Query, Getting the Results, Updating Database Data, The Statement Interface, PreparedStatement, CallableStatement The ResultSet Interface	10
3	Servlet API and Overview Servlet Model: Overview of Servlet, Servlet Life Cycle, HTTP Methods Structure and Deployment descriptor ServletContext and ServletConfig interface, Cookies and Session Management: Understanding state and session, Understanding Session Timeout and Session Tracking.	08

4	Java Server Pages JSP Overview: The Problem with Servlets, Life Cycle of JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment	05
5	Java Server Faces2.0 Introduction to JSF, JSF request processing Life cycle, Overview of Hibernate, Hibernate Architecture, Overview of Spring.	06

Learning Outcomes:

After successful completion of the course students should be able to:

1. Use various tools, and Validation techniques, use of different templates available in IDEA, Implementation and testing strategies in real time applications
2. Use advanced concepts related to Web Services, spring and Hibernate.
3. Create Java based Web Application.
4. To get Knowledge and apply of java based tools and technology in real world application.

Teaching & Learning Methodology:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Books Recommended:

1. Black Book "Java Server Programming" J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy Walrath"
2. Complete Reference J2EE by James Keogh Mcgraw Publication.
3. Professional Java Server Programming by Subrahmanyam Allamaraju, Cedric Buest Wiley Publication.
4. Beginning JSP, JSF and Tomcat, Giulio Zambon, Apress.

E-Resources:

1. https://www.edureka.co/blog/advanced-java-tutorial
2. Software: JDK 8.0, Tomcat, MySQL
3. https://swayam.gov.in

Practical list

Sr. No.	Practical
1	Create chat application using TCP and UDP protocol
2	Implement RPC server for transferring files using socket and serversocket
3	Implement any one routing algorithm using UDP/TCP on server application and give input on client side and client should accept output from server and display output on client side.
4	Implement Student information system using JDBC and HSQL
5	Create servlet application following functions: 1. Connect 2. Create database 3. Create table 4. Insert Records into created table 5. Update records of particular table of database 6. Delete Records from table 7. Drop table and also database
6	User can create a new database and also create new table under that database. Once database has been created then user can perform database operation by using above features. Use following type statement interface to implement program: 1. Statement 2. Prepared statement 3. Callable statement
7	Create database of student subject wise data and retrieve all data using JDBC and generate xml structure along with DTD and XML schema definition
8	Create login form and perform data management using Cookies, HttpSession and URL rewriting

Practical List:

Sr. No.	Practical
1	Create chat application using TCP and UDP protocol.
2	Implement TCP Server for transferring files using Socket and ServerSocket.
3	Implement any one sorting algorithm using TCP/UDP on Server application and Give Input On Client side and client should sorted output from server and display sorted on input side.
4	Implement Student information system using JDBC and RMI.
5	Create Servlet file which contains following functions: 1. Connect 2. Create Database 3. Create Table 4. Insert Records into respective table 5. Update records of particular table of database 6. Delete Records from table. 7. Delete table and also database.
6	User can create a new database and also create new table under that database. Once database has been created then user can perform database operation by calling above functions. Use following Java Statement interface to implement program: 1. Statement 2. Prepared statement 3. Callable statement.
7	Create database of student subject-wise data and retrieve all data using JSP and generate xml structure along with DTD and XML Schema definition.
8	Create login form and perform state management using Cookies, HttpSession and URL Rewriting.

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SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

WEB DATA MANAGEMENT

CODE: 2340607

DEGREE: 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	4	7	5	30	50	70	-	150

Objectives:

This course provides an in depth study of area of Web data management covering XML, XLINK and Xpointer. It also highlights the concepts of ontology, RDF and OWL. The course primarily covers the state of the art in designing and building web applications and services, primarily focusing on issues and challenges that revolve around the management and processing of data.

Prerequisites:

Students are expected to have a working knowledge of SQL and basic HTML, plus one of the many popular web development languages such as Javascript, Ruby, or Python, OWL. Students without adequate preparation are at substantial risk of failing this course.

Course outline:

Sr. No.	Course Contents	Number of Hours
1	**DATA MODEL:** Introduction to Modeling Web Data, Semi structured data, XML, Web Data Management with XML, XML Standards, XML and syntax, XML Data Model, XLink, and XPointer.	5
2	**XPath and XQuery:** Introduction, Basics of XPath and XQuery, XPath: Steps and path expressions, Evaluation of path expressions, Generalities on axes and node tests, Axes, Node tests and abbreviations, Predicates, XPath 2.0 ,FLWOR expressions in XQuery: Defining variables & the for and let clauses, Filtering - the where clause, The return clause, Advanced features of XQuery; XPath foundations	7

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3	**Typing:** Motivating Typing, Automata, Schema Languages for XML, Typing Graph Data: Graph Semistructured Data, Graph Bisimulation, Data guides.	6
4	**XML Query Evaluation:** XML fragmentation, XML identifiers: Region-based identifiers, Dewey-based identifiers, Structural identifiers and updates; XML queries, Holistic twig joins.	6
5	**Ontologies, RDF, and OWL:** Introduction, Ontologies by example, Web resources, URI, namespaces, RDF, RDFS: RDF Schema, OWL, Ontologies and (Description) Logics.	6
6	**Querying Data through Ontologies:** Introduction, Querying RDF data: notation and semantics, Querying through RDFS ontologies, Answering queries through DL-LITE ontologies.	5
7	**Data Integration:** Introduction, Containment of conjunctive queries, Global-as-view mediation, Local-as-view mediation, Ontology-based mediators, Peer-to-Peer Data Management Systems.	5

Learning Outcomes:

Upon successful completion of this course, students will be able to:

- Use multiple programming languages and current web technologies to develop dynamic web sites.
- Develop web services and dynamic web applications that use web services.
- Use XML and OWL technologies to generate and process complex data.
- Store, index, and analyze XML and JSON data using SQL and NOSQL databases.
- Use data analysis tools and cloud computing to analyze web data.

Teaching & Learning Methodology:

For understanding this subject students need to understand about XML, Ontology and how to fire queries and to get data.

Books Recommended:

- Serge Abiteboul, IoanaManolescu, Philippe Rigaux, Marie-Christine Rousset and Pierre Senellart, "Web data management" Cambridge University press,2011.
- BhavaniThuraisingham ," Web Data Management and Electronics Commerce", CRC press 2000
- BhavaniThuraisingham ,"XML Databases and Semantic Web", CRC Press, 2002

E-Resources:

https://in.reuters.com/tools/rss
https://www.altova.com/xmlspy-xml-editor
https://www.w3.org/RDF

Practical List:

Sr. No.	Practical
1	Create an XML file defining an article in newspaper.
2	Create an XML file containing list of students. Also create stylesheet file to display list in an HTML format.
3	Create an XML file containing list of students. Using XPath display following information • Information of a student with ID No : 110 • All the student in the sorted order according to their CGPA
4	Create an XForm to collect information from staff member regarding their publications. Details like Year of Publication, National/International, Title, Conference/Journal etc.
5	From the above gathered information, using XQuery find out the number of publication in a specific year.
6	Demonstrate the use of AJAX.
7	Study of XMLSPY tool.
8	Create an RSS for the events occurring in your institute.
9	Write a program to read the articles in RSS created in above practical.
10	Study of RDF (Resource Description Framework)

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

BIG DATA MANAGEMENT

CODE: 2320608

B.E. 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	4	7	5	30	50	70	-	150

Objective: To understand the basic concepts of Big Data and foundation for understanding how data is managed using Big data concepts. This course will enhance knowledge level of student in Big data technologies by showing recent developments in the field.

Prerequisites: Required Basic Knowledge of Data Base Management System (DBMS) and RDBMS.

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	**INTRODUCTION TO BIG DATA** Introduction– distributed file system–Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce.	05
2	**INTRODUCTION TO HADOOP AND HADOOP ARCHITECTURE** Big Data – Apache Hadoop & Hadoop Ecosystem, Moving Data in and out of Hadoop – Understanding inputs and outputs of Map Reduce -, Data Serialization	10
3	**HDFS, HIVE AND HIVEQL, HBASE** HDFS-Overview, Installation and Shell, Java API; Hive Architecture and Installation, Comparison with Traditional Database, HiveQL Querying Data, Sorting And Aggregating, Map Reduce Scripts, Joins& Sub queries, HBase concepts, Advanced Usage, Schema Design, Advance Indexing, PIG, Zookeeper , how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper	05

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Gandhinagar

4	**SPARK** Introduction to Data Analysis with Spark, Downloading Spark and Getting Started, Programming with RDDs, Machine Learning with MLlib.	09
5	**NoSQL** What is it? Where It is Used Types of NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL, NewSQL.	04
6	**Data Base for the Modern Web** Introduction to MongoDB key features, Core Server tools, MongoDB through the JavaScript's Shell, Creating and Querying through Indexes, Document-Oriented, principles of schema design, Constructing queries on Databases, collections and Documents , MongoDB Query Language	06

Learning Outcomes:

1. Students will to build and maintain reliable, scalable, distributed systems with Apache Hadoop and also able to design and learn MongoDB query language. They also understand the difference between SQL and NOSQL.
2. Students will learn tips and tricks for Big Data uses and solutions.

Teaching & Learning Methodology:

Big Data Analytics allows measuring, monitoring and responding in real time. After delivering theory hands-on practical should be learnt by students.

Books Recommended:

1. Boris Lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions",Wiley.
2. Chris Eaton, Dirk derooset al. , "Understanding Big data ", McGraw Hill.
3. BIG Data and Analytics , Sima Acharya, Subhashini Chhellappan, Willey.
4. Tom White, "HADOOP: The definitive Guide", O Reilly.

E-Resources:

1. http://www.bigdatauniversity.com/
2. https://in.reuters.com/tools/rss
3. https://www.altova.com/xmlspy-xml-editor
4. https://www.w3.org/RDF/

List of Experiments:

1. To understand the overall programming architecture using Map Reduce API.
2. Store the basic information about students such as roll no, name, date of birth, and address of student using various collection types such as List, Set and Map.
3. Basic CRUD operations in MongoDB.
4. Retrieve various types of documents from student's collection.
5. To find documents from Students collection.
6. Develop Map Reduce Work Application.
7. Creating the HDFS tables and loading them in Hive and learn joining of tables in Hive.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING

POWER ELECTRONICS

CODE: 2305051

B.E. V[TH] SEMESTER

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	5	30	50	70	-	150

Objectives:

The power electronic devices and converters employing power electronics devices are now widely used in domestic applications as well as in industrial applications like Electrical Drives, Power Systems, Renewable Energy based power generation, heating applications etc. The course is aimed to act as a foundation block and to provide exposure about various aspects (construction, characteristics, operation, ratings etc.) of power electronic devices. It also covers power electronic converters that provide variable DC voltage.

Prerequisites: - Basic Electronics and Concept of DC Machines

Contents:

Sr. No.	Topics	Teaching Hrs. 48 Hrs
1.	**Power Semiconductor Devices** Construction and Characteristics of Power diodes, Power Transistors, Power MOSFET, Insulated Gate Bipolar transistors (IGBTs) Introduction to Thyristor family : SCR, DIACs, TRIACs, Light Activated SCRs (LASCRs), Reverse Conducting Thyristor , (RCT), Asymmetrical SCR (ASCR), Gate turn-off Thyristors (GTOs), MOS controlled Thyristors (MCTs)	06

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2.	**Thyristor Fundamentals** Construction of SCR, Operating modes, Two transistor analogy, Static & dynamic characteristics, Gate characteristics, Turn on & turn off methods (Commutation methods),Series and Parallel operations of SCRs : Need, String efficiency, Issues, Static and Dynamic Equalizing circuit , Gate Drive/Triggering circuits: R trigger, RC trigger, UJT as an oscillator, dI/dt and dv/dt protection, Design of Snubber Circuit, Over Voltage and Over Current protections, Gate protections, Electro Magnetic Interference(EMI) and Shielding	06
3.	**Phase Controlled (AC to DC) Converters** Review of half-wave and full-wave diode rectifier (with RL load); Principle of phase controlled converter operation; Operation of 1-phase half wave converter with R, RL and RLE load, 1- phase full wave converter : Center-tapped and Bridge Configuration; Operation and analysis with R,RL, RLE load, 3-phase converters : Operation of half wave converter; Full wave fully controlled converters: Analysis and operation with different type of loads; Rectification and Inversion Mode,Dual Converter: Principle and operation; 1-phase and 3-phase configurations; Simultaneous . and Non-simultaneous operation, Applications of AC-DC converters	05
4	**DC to DC Converters** The chopper, Basic principle of DC chopper, Classification of DC choppers, Control strategies. Basic DC-DC converter (switch regulator) topologies: Principle, operation and analysis for Step-down (Buck), Step-up (Boost), Step up/down (Buck-Boost), Continuous conduction and Discontinuous conduction operation Chopper configurations: Voltage Commutated, Current Commutated, Load Commutated Chopper Multi-phase chopper, Application of DC to DC converters	05
5	**DC TO AC CONVERTERS: INVERTERS** Performance parameters of Inverters; Classification of Inverters: Voltage source inverters and Current source inverters; Single phase inverters: series, parallel and bridge type (Half wave and Full wave) inverters; Forced Commutated, Line commutated and Self-Controlled Switches based Inverters; Three phase bridge inverters: 180 degree conduction, 120 degree conduction and their comparison PWM Inverters: Principle of PWM control, PWM techniques classifications, Unipolar and Bipolar PWM, Effect of Switching frequency on Harmonic Spectrum, Sinusoidal PW, Selective Harmonic Elimination, Hysteresis band current control PWM, pace vector pulse width modulation technique and comparisons.	08
6	**AC VOLTAGE CONTROLLERS** Concept of On-Off or integral cycle control and Phase control; Various single phase full wave ac-ac controllers with R, L and RL load; Analysis for phase control and integral cycle control; Gating requirements; Sequence Control of AC regulators; 3-phase full wave converter configurations with Y and Δ connected loads and their analysis with R load; AC Voltage controller with PWM control; Basic principle of matrix converter	06
7	**CYCLOCONVERTERS** Introduction; Basic Principle; Single to single-phase cycloconverters; Three-phase half-wave cycloconverters; Cycloconverters for three phase output; Output voltage equation; Output harmonics in cycloconverter; Comparison between cycloconverter and DC link Converter; Load Commutated cycloconverter.	04

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8	**Introduction to DC Drives** Basic characteristics of DC motors, Two zone operation, Four quadrant operation (Operating modes), Principles of DC motor speed control Single phase separately excited drives: Half Wave converter, Semi- converter and Fully Controlled converter based drives; Braking operation of separately excited drive, Single phase Series DC motor drive,3-phase separately excited drives, Principle of power control (motoring control) of separately excited and series motor with DC-DC Converter; Principle of Regenerative Braking; Chopper configuration for Regenerative braking; Two and four quadrant DC-DC converter drives with phase controlled converters	04
9	**Introduction to [redacted] Induction Motor Drives** Comparison of ac & dc drive; their selection for particular application; Review of Induction Motor fundamentals: Equivalent circuit Characteristics, Basic Equations and speed control methods; motoring and braking, Soft starting: Stator voltage control with AC voltage controller; Six-step VSI inverter based drives; PWM-VSI drives; Braking and multi-quadrant operation of VSI drives; Cycloconverter based induction motor drive; Variable frequency control from a current source; Slip power control using Rotor resistance along-with chopper; Closed loop control schemes; Effect of non-sinusoidal wave form on AC machine performance;	04

Course Outcome:

After learning the course the students should be able to:

1. Explain the construction and characteristics of Power semiconductor devices and fundamental of thyristors and family.
2. Analyze, operate and design ac-to-dc converters.
3. Analyze, operate and design dc-to-dc converters.
4. Apply the knowledge of power electronic converter for speed control of DC motors.
5. Simulate power electronic converters and their control scheme.
6. Analyze, operate and design dc-to-ac inverters.
7. Analyze, operate and design ac-to-ac converters.
8. Apply the knowledge of power electronic converter for speed control of AC motors.
9. Simulate power electronic converters and their control scheme.

Teaching & Learning Methodology: -

Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

Reference Books:

1. M D Singh and K B Khanchandani, "Power electronics", TMH, New Delhi, 2nd ed., 2007.
2. Muhammad H. Rashid, "Power Electronics - Circuits, Devices and Applications", Prentice Hall of India, 3rd ed., 2003.
3. Vedam Subramanyam, "Power Electronics – Devices, Converters and Applications", New Age International Publishers Pvt. Ltd., Bangalore, 2nd ed. 2006.
4. P.S. Bimbhra, "Power Electronics", Khanna Publishers, New Delhi, 2012..
5. Ned Mohan, Undeland and Robbins, "Power Electronics – Converters, Applications and Design",John Willey & sons, Inc., 3rd ed., 2003.
6. V.R.Moorthi, "Power Electronics", Oxford University press, 2005.
7. G..K. Dubey, S.R. Doradla, A. Joshi, and R.M.K. Sinha, "Thyrlstorised Power Controllers", New Age International Ltd. Publishers, 1986 (Reprint 2008).
8. P.T. Krein, "Elements of Power Electronics", Oxford University Press, 1998.
9. G..K. Dubey, " Fundamentals of Electrical Drives", Narosa Publishing House, New Delhl, 2nd ed. 2001.

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List of Experiments:

1. Static and dynamic characteristics of an SCR.
2. R and RC triggering scheme and to determine the firing angle control range.
3. Line synchronized UJT triggering and its use for firing the SCRs of ac-dc converter
4. Use of Triac as a Fan regulator
5. Performance 1- Φ semi-converter & 1- Φ fully controlled (bridge) converter with R and RL load.
6. Effect of inductance, switching frequency, duty cycle, load current on the output ripple voltage of a step-down chopper (using simulation platform like MATLAB/Simulink)
7. Speed control of DC separately excited motor with phase controlled converter or DC-DC converter.
8. SCR based 1-phase ac voltage controller
9. SCR based 1-phase cycloconverter working on the principle of integral half cycle control.
10. Performance of 1-phase bridge inverter with R and R-L load
11. Harmonic spectrum of output voltage for unipolar and bipolar PWM controlled half-bridge and full bridge converter.
12. Performance of 3-phase bridge inverter operating with 120° and 180° conduction mode.
13. Simulation of SVPWM and its effectiveness over SPWM
14. Performance of V/F controlled induction motor drive
15. Closed loop speed control of Induction Motor using stator voltage control
16. Simulation of 1-phase bridge type cycloconverter in MATLAB

List of Open Source Software/learning website:

1. http://nptel.iitm.ac.in/coursecontents_elec.php
2. ocw.mit.edu/courses/electrical.../6-334-power-electronics-spring-2007

Active learning Assignments (AL) : Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to SSIU.

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HOD (Elect.)
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SWARNIM STARTUP AND INNOVATION UNIVERSITY
SWARRNIM INSTITUTE OF TECHNOLOGY

ELECTRICAL ENGINEERING
ELECTRICAL POWER SYSTEM – I
SUBJECT CODE: 2305052
B.E. 5th SEMESTER

Type of course: Engineering Science (Electrical)

Prerequisite: Nil

Rationale: NA

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	0	3	70	30	—	0	0	0	100

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Supply Systems:** Electric supply system, Typical AC power supply Scheme, Comparison of DC and AC transmission, Advantages of high transmission voltage, Various system of power transmission, Comparison of conductor material in overhead system, Comparison of conductor material in underground system, Comparison of various systems of transmission, Elements of a transmission line, Economics of power transmission, Economical choice of conductor size, Economic choice of transmission voltage, Requirement of satisfactory electric supply.	6	15
2	**Mechanical Design of Transmission Lines:** Main components of over head lines, Conductor materials, Line supports, insulators, Types of insulators, Potential distribution over suspension insulators, String efficiency, Methods of improving string efficiency, Sag in over head lines and sag calculations.	6	15
3	**Inductance and Resistance of Transmission Line:** Introduction, Definition of Inductance, Flux Linkages of an isolated current carrying conductor, Inductance of a single phase two wire line, Conductor types, Flux Linkages of one conductor in group, Inductance of composite conductor lines, Inductance of three phase lines, Double circuit three phase lines, Bundled conductors, Resistance, Skin effect and Proximity effect,	9	15
4	**Capacitance of Transmission Lines:** Introduction, Electric field of a long straight conductor, Potential difference between two conductors of a group of parallel conductors, Capacitance of a two wire line, Capacitance of a three phase line with equilateral spacing, Capacitance of a three phase line with unsymmetrical spacing, Effect of earth on transmission line capacitance, Method of GMD, Bundled conductors, Electrostatic induction.	6	15
5	**DC and AC distribution :** Distribution system, classification of Distribution systems, AC distribution, DC distribution, Connection scheme	6	15

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	of distribution system, Types of DC distributors, DC distribution calculations, DC distributor fed at one end, uniformly loaded distributor fed at one end, distributor fed at both ends, Distributor with both concentrated and uniform loading, Ring distributor, Ring main distributors with interconnector, AC distribution calculations, Methods of solving AC distribution problems, 3-phase unbalanced loads – 4 wire, Star connected unbalanced loads, Ground detectors.		
6	**Underground cables:** Underground cables, Construction of cables, Classification of cables, Cables for three phase services, Insulation resistance of a single core cable, Capacitance of a single core cable, Dielectric stresses in a single core cable, Most economical conductor size in a cable, Grading of cables, Capacitance grading and inter sheath grading, Capacitance of three core cable and measurement of capacitance.	**6**	**10**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25%	**25%**	**20%**	**15%**	**10%**	**5%**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Modern Power System Analysis by D P Kothari and I J Nagrath : Fourth Edition: McGraw Hill [3, 4, 6]
2. Principles of Power System by V.K.Mehta and RohitMehta : Reprint 2014 : S. Chand [1, 2, 5, 7]
3. Power Systems Analysis : John J. Grainger and W. D. Stevenson Jr., Tata McGrawHill International.
4. Electrical Power systems: C. L .Wadhwa, 5th Edition, New Age InternationalPublishers.

Course Outcome:

After learning the course the students should be able to:

1. Understand Supply Systems
2. Explain mechanical design of transmission line
3. Calculation of line parameters (Resistance, inductance and capacitance)
4. Compare DC and AC distribution
5. Explain the representation of different power system components and loading capability of a generator
6. Describe underground cables

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to ssiu.

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING

CONTROL SYSTEM ENGINEERING

CODE: 23050503

B.E. V[TH] SEMESTER

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	5	30	50	70	-	150

Contents:

Sr. No.	Topics	Teaching Hrs. (39 Hrs.)
1.	**Introduction to Control Systems**: Introduction, Brief History of Automatic Control, Examples of Control Systems, Engineering Design, Mechatronic Systems, The Future Evolution of Control Systems.	3
2.	**Mathematical Models of Systems:** Differential Equations of Physical Systems, Linear Approximations of Physical Systems, The Laplace Transform, The Transfer Function of Linear Systems, Block Diagram Models, Signal-Flow Graph Models.	4
3.	**State Variable Models:** The State Variables of a Dynamic System, The State Differential Equation, The Transfer Function from the State Equation , The Time Response and the State Transition Matrix.	4
4.	**Feedback Control System Characteristics:** Error Signal Analysis, Sensitivity of Control Systems to Parameter Variations ,Disturbance Signals in a Feedback Control System, Control of the Transient Response, Steady-State Error, The Cost of Feedback.	4
5.	**The Performance of Feedback Control Systems:** Test Input Signals, Performance of Second-Order Systems, Effects of a Third Pole and a Zero on the Second-Order System Response, The s-Plane Root Location and the Transient Response, The Steady-State Error of Feedback Control Systems, Performance Indices, The Simplification of Linear Systems.	4

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6.	**The Stability of Linear Feedback Systems:** The Concept of Stability, The Routh-Hurwitz Stability Criterion, The Relative Stability of Feedback Control Systems.	4
7.	**The Root Locus Method:** The Root Locus Concept. The Root Locus Procedure, Parameter Design by the Root Locus Method, Sensitivity and the Root Locus, Three-Term (PID) Controllers.	4
8.	**Frequency Response Methods:** Frequency Response Plots, Frequency Response Measurements, Performance Specifications in the Frequency Domain, Log Magnitude and Phase Diagrams.	4
9.	**Stability in the Frequency Domain:** Mapping Contours in the s-Plane, The Nyquist Criterion, Relative Stability and the Nyquist Criterion, Time-Domain Performance Criteria in the Frequency Domain, System Bandwidth	4
10.	**The Design of Feedback Control Systems:** Approaches to System Design, Cascade Compensation Networks, Phase-Lead Design Using the Bode Diagram, Phase-Lead Design Using the Root Locus, System Design Using Integration Networks, Phase-Lag Design Using the Root Locus, Phase-Lag Design Using the Bode Diagram, Approaches to System Design, Cascade Compensation Networks, Phase-Lead Design Using the Bode Diagram, Phase-Lead Design Using the Root Locus, System Design Using Integration Networks, Phase-Lag Design Using the Root Locus, Phase-Lag Design Using the Bode	4

Course Outcome: After learning the course the students should be able to:

- Apply systems theory to complex real world problems in order to obtain models that are expressed using differential equations, transfer functions, and state space equations
- Predict system behavior based on the mathematical model of that system where the model may be expressed in time or frequency domain
- Analyze the behavior of closed loop systems using tools such as root locus, Routh Hurwitz, Bode, Nyquist, and Matlab
- Design controllers using classical PID methods, root locus methods, and frequency domain methods.
- Devise a safe and effective method of investigating a system identification problem in the lab
- Write a report that effectively communicates the results of an analysis or design.

Teaching & Learning Methodology: -

Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

Reference Books:

1. Modern Control Engineering by Katsuhiko Ogata, 4th Edition, Prentice Hall of India.
2. Automatic Control Systems by Benjamin C.Kuo, 8th Edition, Farid Golnaraghi, John Wiley & Sons.
3. Linear control system by B.S.Manke
4. Control Systems Engineering by Nagrath and Gopal New Age Publication
5. Modern Control System by Richarc C. Drof and Robert H. Blshop,11th Edition Person Int

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List of Experiments:

Some experiments/practical are suggested as the guideline to study:-

1. Generating standard test signals i.e. step, ramp, unit impulse on a simulator
2. Analysis of time response of second order system
3. Effect of P, PD, PI, PID Controller on a second order systems.
4. Plotting root locus of a given transfer function using a simulator
5. Temperature control using PID
6. Plotting phase magnitude plot of a given transfer function with a simulator.
7. Obtaining frequency response of a common emitter amplifier and plotting on a Bode plot.
8. Simulation of a given transfer function using OPAMPs
9. Stability Analysis (Root locus, Bode, Nyquist) of Linear Time Invariant System.
10. Study of a PLL as a closed loop control system on a simulator.

Use SCILAB/MATLAB or other equivalent software as a simulator.

Design based Problems (DP)/Open Ended Problem:

- Op Amp Differentiating Circuit, Pulse Generating Op Amp, OP Amp Control System, PLL Television Beam Circuit,
- Space Shuttle Rocket, Satellite Orientation Control, Roll Angle Control,
- Mars Rover Vehicle, Mars Guided Vehicle Control, Mars Rover,
- Disk Drive Read Write System, Rotating Disk Speed Control, Disk Drive Read .
- Wind Power,
- Embedded Computers,

Lab Work: MATLAB/SCILAB based assignments and simulations covering design, analysis and modelling of control systems relevant to curriculum.

List of Open Source Software/learning website:

Ng-spice/MATLAB, www.nptel.com

Active learning Assignments (AL) : Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to SSIU.

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING

ELEMENTS OF ELECTRICAL DESIGN

CODE: 2305050 4

B.E. VTH SEMESTER

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives:

This course is a preliminary course for design of various electrical equipments. The aim is to provide the basic principles useful for the subjects related to design in subsequent semesters. The course also includes basics of estimation and costing of house wirings and commercial wirings.

Prerequisites: - Elements of Electrical Engineering, DC Machines and Transformer

Contents:

Sr. No.	Topics	Teaching Hrs. 40 Hrs.
1.	**GENERAL DESIGN ASPECTS:** Basic principles of magnetic circuits – use of B-H curves in magnetic circuit; Calculations of MMF for air gap and teeth; Real and apparent flux density; Field Form; Air gap flux distribution factor (field form factor); Magnetising current calculation; Leakage Reactance calculation for various types of slots, Iron loss calculation concepts; Insulating Materials & Classifications.	6
2	**DESIGN OF STARTERS AND FIELD REGULATORS:** Introduction and review of A.C. and D.C. starters; Schematic diagrams of control circuit and power circuit for starters with contactors and timers. Design of starters and Field regulators. **DESIGN OF SMALL TRANSFORMERS AND CHOKE COILS:** Design of Small single-phase transformers; Design of variable air gap single phase and three phase choke coil; Design of ballast	8

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3	**Armature Windings: DC windings :** Simplex & Duplex windings; Lap & Wave windings; Applications; Basic terms related to armature windings; Dummy Coils; Equalizer connections; Split coils. **AC windings :** Introduction; No. of phases; Phase spread; Concentric winding, Hemitropic winding; Whole coil winding; Mush winding; Double layer windings; Integral slot lap and wave winding; Fractional slot lap and wave windings; Performance analysis of various windings.	12
4.	**Estimation and Costing for Residential and Commercial wiring:** Preparation of schematic diagrams and estimation of cost of wiring for Tenaments, Row houses, Bungalows, Flats, Multi – Storied Buildings, Commercial Complexes like Offices, Hospitals, Hotels, and Theatres.	8
5.	**Design consideration of Electrical Installation:** Types of load, Electrical Supply Systems, Wiring systems, Load Assessment, Permissible voltage drops & Conductor size calculations, Design of Control panel. Estimation and costing for service connections.	8

Course Outcome:

After learning the course the students should be able to:

- Explain the basic concepts related to design of electrical equipments.
- Design the starters, field regulators, small transformers and choke coils.
- Draw and explain the winding diagrams for AC and DC machines.
- Estimate the cost of wirings.

Teaching & Learning Methodology: -

Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

Reference Books:

1. A course in electrical machine Design – A. K. Sawhney
2. Electrical Machine Design – R. K. Agrawal
3. Design of Electrical Machine - V. N. Mittle
4. Elements of Electrical Design – J G Jamnani

List of Experiments:

During the laboratory hours, the design problems based on the syllabus should be assigned to the students. After carrying out the detailed design, drawing sketches and winding diagrams should be prepared by the students. Minimum five drawing sheets must be prepared and evaluated at the end of the term.

List of Open Source Software/learning website:

- http://www.electrical-engineering-portal.com/
- http://nptel.iitm.ac.in/courses.php

Virtual Lab Website

www.vlab.co.in

(Prof. V. B. Babaria)

Active learning Assignments (AL):

Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to SSIU.

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HOD (E)

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING

MICROPROCESSOR AND MICROCONTROLLER ARCHITECTURE AND INTERFACING

SUBJECT CODE: 2305050 5

B.E. 5th SEMESTER

Type of course: Engineering (Electrical)

Prerequisite: N.A

Rationale: This subject focuses on the study of microprocessor and microcontroller along with the basics of Digital Circuits. It also briefs the students about interfacing of memory and I/O devices like A to D converter, D to A converter LED, LCD etc. The students learn the Programming language (Both assembly and Embedded C) used for microcontrollers. They learn the basics of Microprocessor and design of Microcontroller based systems. They will be able to use the same inelectrical engineering related fields like Power system protection, instrumentation, power electronics, Electrical Drives and control of Electrical Equipments.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Evaluation Scheme			
				Internal		External	Total
Th	Tu	Pr		Th	Pr	Th	
4	0	2	5	30	50	70	150

Legends: Th-Theory; **Tu** – Tutorial; **Pr** - Practical; **Cr** – Credit

Contents:

Sr. No.	Content	Total Hrs (56 Hrs)
1	**Review of logic devices and memories:** Latches, Flip flops, Buffers, Controller buffer registers, Decoders Memory Cell, Internal organization of Memory Chips, Types of Memories Ram Rom PROM EPROM EEPROM, Flash Memory.	03

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2	**Microprocessor Based Systems:** Digital Computer, Microprocessor, Microcomputer, Microcontroller, Van Neumann and Harvard Architecture, CISC and RISC Processors	02
3	**8085 Microprocessor:** Architectural Block Diagram, Schematic and Pin diagrams, Pin functions, Bus Organization, Internal operations and registers, Externally initiated operations, Serial interrupt and I/O Control, Brief Introduction of Instruction and assembly language Program, (Complete 8085 instruction set and Programming of assembly language 8085 should not be covered & asked in the exam) Timing and Control Unit ,Microprocessor communication, Multiplexing of address/data bus, Generation of control signals, 8085 machine cycles, Fetch and execution of only MOV, STA, and OUT instructions with timing diagram.	08
4	**8051 Microcontroller architecture**: Introduction to MCS -51 Family microcontrollers, Architectural block Diagram, Pin diagram and PinFunctions General Purpose and Special Function Registers, , Oscillator and clock circuit, Reset circuit, I/O Port circuits, Memory organization, Internal program and data memory.	07
5	**Introduction to Program Development Tools (IDE):** Concept of IDE, Editor, Assembler, Compiler, Linker, Simulator, Debugger and assembler directives.	02
6	**8051 Assembly** language **pro**gramming: Programming model of 8051, Addressing modes, data transfer instructions, I/O Port programming, Arithmetic and Logical instructions, Bit level instructions, Branching instructions (Jump and loop Jump and call), Concept of stack, subroutine and related instructions, writing programs (like time delay using loop, data conversions HEX to ASCII, BCD to ASCII, use of look up table etc) in assembly language 8051 and testing the same using IDE.	08
7	**8051 Programming in C:**Data types in 8051 C, programming for time delay, I/O programming in 8051 C, Logic operations in 8051 C, Control statements and loops in embedded C, Functions and Arrays in embedded C, Data conversion programs in 8051 C, , Accessing code ROM space using 8051 C, Data serialization using 8051 C.	05
8	**Memory& Interfacing:** Memory address decoding, interfacing 8031/8051 with ROM/EPROM and Data ROM	02
9	**Timer/Counter and Programming(8051):** Use of counter as timer, Timer/Counters and associated registers, Various modes of timer/counter operations, Time delay programs in Assembly language/ Embedded C	03
10	**Serial Port and Programming(8051):** Basics of serial communication, RS232 standards, 8051 connection to RS232, Serial data input/output and associated registers, Various modes of serial data communication, serial data communication programs in Assembly language/ Embedded C	03
11	**Interrupts (8051):** Concept of Interrupt, interrupt versus polling, Types of interrupts in 8051, Reset, interrupt control and associated registers, interrupt vectors, Interrupt execution, RETI instruction, software generated interrupt, interrupt handler subroutine for timer/counter and serial data transmission/reception in Assembly language/ Embedded C ,	04
12	**Applications of microcontroller based systems:** Interfacing of LEDs, 7 Segment display device, LCD display, DIP Switches, Push Button switches, Key denounce techniques, Keyboard connections load per key and matrix form, Interfacing A/D converter, D/A converter, Relay, opto isolator stepper motor and DC motor.	09

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Reference Books:

1. Microprocessor Architecture, Programming, and Applications with the 8085, By Romesh Gaonkar, Penram International Publishing (India) LTD.
2. The 8051 Microcontroller and Embedded Systems Using Assembly and C, 2/e by Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin McKinlay (Second Edition , Pearson Education)
3. The 8051 Microcontroller & Embedded Systems using Assembly and C By K. J. Ayala, D. V. Gadre (Cengage Learning , India Edition).
4. Using the MCS-51 Microcontrollers By Han Way Huang Oxford Uni Press
5. Programming and Customizing the 8051 Microcontroller by Myke Predko Tata Mcgraw Hill.

Learning Outcome:

1. Apply the concept of buses, microprocessor architecture and interrupts.
2. Interface memory and I/O devices with 8 bit microprocessor/microcontroller
3. Describe 8 bit microcontroller architecture-of MCS -51 family
4. Program assembly language programming/ C programming of 8051
5. Design microcontroller based small system

Experiments:

1. Introduction to IDE and Assembler directives.
2. 8051 Assembly language programming for addition, subtraction, multiplication and division of two 8-bit numbers .
3. 8051 Assembly language programming for block data transfer between internal and external memoryincluding overlapping blocks.
4. 8051 Assembly language programming using Arithmetic instructions
5. 8051 Assembly language programming using Logical Instructions
6. 8051 Assembly language programming for code conversions
7. 8051 Assembly language programming for Timers in different modes.
8. I/O port programming in embedded C.
9. Timers and Counters programming in embedded C for time delay and frequency measurement using ISRs.
10. Digital clock programming using 7- segment display in embedded C.
11. Programming of LCD in embedded C.
12. Programming of keyboard in embedded C.
13. Serial communication and UART programming in Embedded C.
14. Programming of parallel ADC and DAC in embedded C.
15. Interfacing Stepper Motor.
16. Speed Control of DC motor using PWM Technique and Microcontroller
17. Designing of SCR firing Circuit for D. C. Converter using Microcontroller
18. Interfacing Relay and opto isolators using Microcontroller

Design based Problems :

1. Frequency and Pulse with measurement using microcontroller 8051
2. Temperature Measurement and control using microcontroller 8051
3. Measurement of Electrical Quantity using microcontroller 8051
4. Communication between microcontroller 8051 and Computer
5. Triac triggering using microcontroller 8051

Major Equipment: Kit for Microcontroller 8051, µVISION2/3/4 IDE,

Open Source Software/website: NPTEL, www.infineon.com, www.silabs.com

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HOD (E&C)
2511

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING

INDUSTRIAL AUTOMATION

CODE: 2305061

B.E. VI[TH] SEMESTER

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	5	30	50	70	-	150

Objectives:

The course provides the student with basic knowledge of the industrial automation systems design, installation, modification, maintenance, and repair. Automation is the aura of any industry. It has found its place and importance in Industries to handle any sophisticated process to increase the productivity. In consequence, automation experts play a quintessential role in Industries which systematize the Plant operations. It explores to the technology of Industrial Automation and Control as widely seen in factories of all types both for discrete and continuous manufacturing. The course discusses a wide range of related topics from the advantage and architecture of automation systems, measurement systems including sensors and signal conditioning, discrete and continuous variable control systems, hydraulic, pneumatic and electric actuators, industrial communication and embedded computing and CNC Machines.

Prerequisites: - Control System Engineering

Contents:

Sr. No.	Topics	Teaching Hrs. (48 Hrs)
1.	**General Concepts:** General concepts of the Industrial production. Concepts of production systems and production processes. Automation production systems and their classification. Architecture of Industrial Automation Systems.	05

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2.	**Control Technologies in Automation:** Industrial Control Systems, Process Industries Versus Discrete-Manufacturing Industries, Continuous Versus Discrete Control, Computer Process and its Forms. Controlled variable, controlling parameters, process equation load, transient, process, lag, self-regulation, control lag, variable range, dead time, cycling.	**09**
3.	**Introduction to Automatic Control:** Characteristic of different discrete controller mode, two position mode, multi position mode, floating control mode, introduction of different continuous controller mode. Proportional, integral, derivative, PI, PID Control, PID Control Tuning, Feed forward Control Ratio Control, Time Delay Systems and Inverse Response Systems, Special Control Structures, Introduction to Sequence Control, PLC, RLL, Sequence Control. Scan Cycle, Simple RLL Programs, Sequence Control. More RLL Elements, RLL Syntax, A Structured Design Approach to Sequence Control, PLC Hardware Environment	**14**
4.	**Control System Components:** Flow Control Valves, Hydraulic Control Systems – I, Hydraulic Control Systems – II, Industrial Hydraulic Circuit, Pneumatic Control Systems – I, Pneumatic Systems – II, Energy Savings with Variable Speed Drives, Introduction to CNC Machines	**08**
5.	**Distributed Control System:** Evaluation of DCS, system architecture-hierarchical of DCS at function levels, Database organization, system implementation concepts, System elements-fields, station, intermediate station, central computer system, Building Blocks of Automation Systems: LAN, Analog & Digital I/O Modules, SCADA. Higher Level Automation Systems	**12**

Course Outcome:

After the successful completion of this course, the student will be able:

1. To identify potential areas for automation and justify need for automation
2. To select suitable major control components required to automate a process or an activity
3. To translate and simulate a real-time activity using modern tools and discuss the benefits of automation.
4. To identify suitable automation hardware for the given application.
5. To recommend appropriate modeling and simulation tool for the given manufacturing application.

Teaching & Learning Methodology: -

Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

Reference Books:

1. Johnson, C.D., "Process Control Instrumentation Technology", Prentice Hall.
2. Liptak, B.G., "Instrument Engineers – Handbook", (Vol. – II), CRC Press.
3. Groover, M.P., "Automation, Production Systems and Computer Integrated Manufacturing", Pearson Education, 5th Ed, 2009.
4. Krishna Kant, "Computer Based Industrial Control", EEE-PHI, 2nd Ed, 2010.
5. Viswanandham, "Performance Modeling of Automated Manufacturing Systems", PHI, 1st Ed, 2009.

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6. Morriss, S.B., "Programmable Logic Controllers", Prentice hall.
7. Webb, J.W., and Reis, R.A., "Programmable Logic Controllers: Principles & Applications", Prentice Hall, 2002.
8. Shinskey, F.G., "Process Control Systems: Application, Design and Tuning", McGraw-Hill Professional, 1996.
9. Thomas E. Marlin, "Process Control: Designing Processes and Control for Dynamic Performance", McGraw – Hill, International Edition
10. Dale E. Seborg, Thomas F. Edger, Duncan A. Mellichamp, "Process Dynamics and Control", Wiley India.

List of Experiments:

1. Introduction of PLC and PLC trainer system kit
2. Introduction to PLC Programming
3. Input/ Output specifications, wiring & configuration of PLC
4. To develop a ladder diagram for a stepper motor based pick & place jig
5. To develop a ladder diagram for an L.V.D.T. and lead screw type arrangement jig
6. To develop a ladder diagram for a Bottle filling and Conveyor belt jig
7. To develop a ladder diagram for temperature measurement and control jig
8. To develop a ladder diagram for sequential lamp On/Off jig
9. Interfacing of PLC to the PC and Real-time programming
10. To Study of SCADA based industrial automation

SUGGESTED LIST OF STUDENT ACTIVITIES:

Industrial Control Applications: Cases Studies minimum one for Cement, Thermal, Water Treatment & Steel Plants applications

Major Equipments:

Programmable Logic Controllers PLC Training Kit Hardware, Software & USB Interface

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SWARNIM STARTUP AND INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TE CHNOLOGY

ELECTRICAL ENGINEERING

ELECTRICAL POWER SYSTEM – II

SUBJECT CODE: 2305060 2

B.E. VI[th] SEMESTER

Type of course: Engineering Science (Electrical)

Prerequisite: Electrical Power System – II

Rationale: NA

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	0	3	70	30	---	00	00	00	100

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Current and Voltage Relations on a Transmission Line:** Representation of line, The short transmission line, The medium-length line, The long transmission line: Solution of the differential equations, The long transmission line: Interpretation of the equations, The long transmission line: Hyperbolic form of the differential equations, The equivalent circuit of a long line, Power flow through a transmission line (circle diagrams), Reactive compensation of transmission lines.	9	15
2	**Symmetrical Three-Phase Faults:** Transients in RL Series circuits, Short-Circuit currents and the reactances of Synchronous machines, Internal voltages of loaded machines under transient conditions, The bus impedance matrix in fault calculations, A bus impedance matrix, equivalent network, The selection of circuit breakers.	9	20
3	**Symmetrical Components:** Synthesis of Unsymmetrical phasors from their symmetrical components, The symmetrical components of unsymmetrical phasors, Phase shift of symmetrical components in Star- Delta Transformer Banks [2], Power in terms of symmetrical components, Sequence circuits of Y and Δ impedances, Sequence circuits of a symmetrical transmission line, Sequence circuits of the synchronous machine, Sequence circuits of a Y- Δ transformer, Unsymmetrical series impedances, Sequence networks	9	15
4	**Unsymmetrical Faults:** Single line to ground fault on an unloaded generator, Line to Line fault on an unloaded generator, Double Line to Ground fault on an unloaded generator, Unsymmetrical faults on power systems, Single line to Ground fault on a power system, Line to Line fault on a power system, Double Line to Ground fault on a power system, Interpretation of the interconnected sequence networks, Analysis of unsymmetrical faults using the bus impedance matrix, Faults through impedance, Computer calculations of fault currents	9	20

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Modified 2016

5	**Corona:** Critical Disruptive Voltage, Corona Loss, Line Design based on Corona, Disadvantages of Corona, Radio Interference, Inductive interference between Power and Communication lines.	**3**	**10**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15%	**25%**	**20%**	**20%**	**20%**	**0%**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Power System Analysis : John J. Grainger, William D. Stevenson Jr., Tata McGraw Hill [1,2,3]
2. Elements of Power Systems Analysis : W. D. Stevenson Jr., 4th Edition, McGraw Hill International. [4]
3. Electrical Power systems: C. L .Wadhwa, 5th Edition, New Age International Publishers.[5, 6]
4. Modern Power system Analysis by I J Nagrath, D P Kothari,4th Edition Tata McGraw Hill.
5. Power System Analysis by Hadi Saadat, Tata McGraw Hill.

Course Outcome:

After learning the course the students should be able to:

1. Analyze the performance of Short and Medium transmission line.
2. Describe the symmetrical components and its applications.
3. Analyze Symmetrical and Unsymmetrical faults in power systems.
4. Describe transients in power systems.
5. Describe corona effect.

List of Experiments:

1. To obtain voltage regulation and efficiency of a short transmission line for different specified set of receiving end quantities (different load at leading, unity and lagging power factor).
2. To write computer program for voltage regulation and efficiency of short transmission line for different specified set of receiving end quantities (different load at leading, unity and lagging power factor).
3. To obtain voltage regulation and efficiency of a medium transmission line for different specified set of receiving end quantities (different load at leading, unity and lagging power factor).
4. To write computer program to calculate voltage regulation and efficiency of a Medium transmission line (using π model& T model) for different specified set of receiving end quantities (different load at leading, unity and lagging power factor).
5. To write computer program to calculate voltage regulation and efficiency of a Long transmission line using equivalent π modelfor different specified set of receiving end quantities (different load at leading, unity and lagging power factor).

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6. To plot sending end power circle diagram and receiving end power circle diagram of a transmission line on a graph paper with some suitable scale.
7. To simulate transient in series R-L circuit with special attention to change in DC offset current for application of excitation at different instant.
8. To study phase shifting in star- delta transformer with emphasis on the labeling on HV and LV sides. The study should be for positive sequence and negative sequence both.
9. Dynamic simulation of three phase fault on terminal of unloaded synchronous generator. The simulation should show the waveforms of all three line current for fault at different instant on voltage wave of phase A.
10. To analyze L-G fault of a small system (containing generator, transformer and lines) using interconnection of sequence networks.
11. To analyze L- L-G and L- L fault of a small system (containing generators, transformers and lines) using interconnection of sequence network.
12. Calculation of symmetrical components for three to four different set of unbalanced three phase phasors.
13. To write a computer program for obtaining symmetrical components for a given set of unbalanced phasors.
14. Calculation of fault current for a three phase fault in a small power system.
15. To write a computer program for animation of travelling waves of a long transmission line with different operating conditions.

Design based Problems (DP)/Open Ended Problem:

The list of suggested design based problems is as follows:

1. Design of short transmission line for the specified performance parameters and different given load (with power factor).
2. Design of medium transmission line transmission line for the specified performance parameters and different given load (with power factor).
3. Design of long transmission line for the specified performance parameters and different given load (with power factor).
4. Selection of circuit breaker rating (at various buses) for a given small radial feeder for different fault locations and type of faults. The feeder is fed at one end by a voltage source only.
5. Selection of circuit breaker rating (at various buses) for a given small meshed transmission network for different fault locations and type of faults. The network may be fed by some generators.

These problems may be done on paper by hand and/or using some simulation software.

Major Equipment:

MATLAB, C/C++, SciLab

List of Open Source Software/learning website:

http://nptel.iitm.ac.in/coursecontents_elec.php

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY
DEPARTMENT OF ELECTRICAL ENGINEERING
DESIGN OFDC MACHINES AND TRANSFORMERS
CODE: 23050603
B.E. VITH SEMESTER

Prerequisite: Elements of Electrical Engineering, DC Machines and Transformer

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Content:

Sr. No.	Content	Total Hrs (39 Hrs.)	% Weightage
1	GENERAL DESIGN ASPECTS: Specific electric loading and Specific magnetic loading; Output coefficient; Output equations for transformers and rotating machines; Factors affecting size of machines; Criteria for selection of specific loadings; Heating and Cooling of Transformers and rotating machines.	6	20
2	DESIGN OF THREE PHASE TRANSFORMER: Types of transformers; Position of HV and LV windings and its importance; Relation between core and yoke cross section area and its significance; Different types of transformer windings; Different positions of taping; Window space factor; Factors affecting window space factor; Relation between emf per turn and transformer rating; Stacking factor. MAIN DIMENSIONS: Design of window dimensions, yoke dimensions and overall core Dimensions; Numerical examples. DESIGN OF WINDINGS: Design of HV and LV windings (No. of turns and area of cross section); Selection of type of winding. PERFORMANCE PARAMETERS ESTIMATION: Primary and secondary winding resistance and Leakage reactance calculation; Calculation of no load current, losses and temperature rise of transformer; Design of tank with tubes; Calculation of dimension of tank; Numerical examples. Variation of output and losses in transformer with linear dimensions; Basic design aspects of dry transformer and high frequency transformers. Basic design aspects of welding transformers and instrument transformers.	18	40

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HoD (Elect) 2/6

3	DESIGN OF DC MACHINES: Introduction; Output equation; MMF calculation; Selection of number of poles; Design of core length and armature diameter; Carter's fringing curves and its significance; Design of length of air gap; Numerical examples. ARMATURE DESIGN: Choice of armature winding; Armature conductor; Number of armature slots; Slot dimensions; Slot loading; Design of armature core; Numerical examples. DESIGN OF FIELD SYSTEMS: Pole design; Design of field winding of shunt, series and compound machines; Design of inter poles; Effects and minimization of armature reaction; Design of commutator and brushes; Numerical examples. Performance parameters evaluation.	15	40

Reference Books:

1. A course in electrical machine Design – A. K. Sawhney
2. Electrical Machine Design – R. K. Agrawal
3. Design of Electrical Machine- V. N. Mittle

Course Outcome:

After learning the course the students should be able to:

1. Design the DC machine of given specifications.
2. Design the transformers of given specifications.
3. Prepare the detailed sketches of the designed machines.

List of Experiments:

During the laboratory hours, the design problems based on the syllabus should be assigned to the students. After carrying out the detailed design, drawing sketches should be prepared by the students. Minimum five drawing sheets must be prepared and evaluated at the end of the term.

Design based Problems (DP)/Open Ended Problem:

(1) Carry out the detailed design of a 63 kVA, 11 kV/440 V, 50 Hz, Three phase, Delta/Star, core type, oil immersed, natural cooled distribution transformer. Maximum temperature rise should not exceed 45 degree centigrade. Prepare the drawings of designed transformer with appropriate scale. Prepare a list of accessories for this transformer.

(2) Carry out the detailed design of a 10 MVA, 66 kV/11 kV, 50 Hz, Three phase, Delta/Star, core type, oil immersed, Oil natural Air forced cooled power transformer. Maximum temperature rise should not exceed 45 degree centigrade. Prepare the drawings of designed transformer with appropriate scale. Prepare a list of accessories for this transformer.

(3) Carry out the detailed design of a 100 MVA, 132 kV/66 kV, 50 Hz, Three phase, Star/Star, core type, oil immersed, Oil forced Air forced cooled power transformer. Maximum temperature rise should not exceed 45 degree centigrade. Prepare the drawings of designed transformer with appropriate scale. Prepare a list of accessories for this transformer.

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Dahyabhai
HOD (Elect.)

(4) Do the survey of latest trends in transformer manufacturing technology and corresponding applications. What is its impact on the power system? Use internet and other resources.

(5) Carry out the detailed design of a 50 kW, 240 Volt, 1500 rpm, DC shunt motor to be used for industrial application. Maximum temperature rise should not exceed 45 degree centigrade. Prepare the drawings of designed machine with appropriate scale.

(6) Carry out the detailed design of a 3.8 kW, 240 Volt, 1500 rpm, DC shunt machine to be used for the laboratory of an academic institution. Maximum temperature rise should not exceed 45 degree centigrade. Prepare the drawings of designed machine with appropriate scale.

Major Equipment:

Lab set ups of following machines

(1) Cut section models of (a) Transformer (b) DC machine
(2) Charts to explain various parts of machines

List of Open Source Software/learning website:

1. http://www.electrical-engineering-portal.com/
2. http://nptel.iitm.ac.in/courses.php
3. Virtual Lab Website www.vlab.co.in

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HoD (Elect)
2016

SWARNIM STARTUP & INNOVATION UNIVERSITY
SWARRNIM INSTITUTE OF TECHNOLOGY
DEPARTMENT OF ELECTRICAL ENGINEERING

HIGH VOLTAGE ENGINEERING
CODE: 2305060 4
B.E. VITH SEMESTER

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives:

The course provides the student with basic knowledge of the high voltage application and its use in electrical field.

Contents:

Sr. No.	Topics	Teaching Hrs.
1.	**Electrostatic fields and field stress control :** Electrical field distribution and breakdown strength of insulating materials - fields in homogeneous, isotropic materials - fields in multi-dielectric, isotropic materials - numerical method: Finite Element Method (FEM), charge simulation method (CSM)	04
2.	**Electrical breakdown in gases** Gases as insulating media - ionization and decay processes, Townsend first ionization coefficient, photoionization, ionization by interaction of metastable with atoms, thermal ionization, deionization by recombination, deionization by attachment–negative ion formation, examples - cathode processes – secondary effects, photoelectric emission, electron emission by positive ion and excited atom impact, thermionic emission, field emission, Townsend second ionization coefficient, secondary electron emission by photon impact, examples - transition from non -self-sustained discharges to breakdown, the Townsend mechanism, examples- the streamer or 'kanal' mechanism of spark, examples - the sparking voltage–Paschen's law, penning effect, the breakdown field strength, breakdown in non-uniform fields- partial breakdown, corona discharges	05

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3.	**Breakdown in liquid and solid dielectrics** Liquid as insulators, breakdown in liquids - electronic breakdown, suspended solid particle mechanism, cavity breakdown, examples - static electrification in power transformers, transformer oil filtration, transformer oil test, alternative liquid insulations like vegetable oils, esters and silicon oils - breakdown in solids, intrinsic breakdown, streamer breakdown, electromechanical breakdown, edge breakdown and treeing, thermal breakdown, erosion breakdown, tracking breakdown of solid dielectrics in practice, partial discharges in solid insulation, solid dielectrics used in practice	07
4.	**Generation of high voltages :** Generation of high direct voltages, half and full wave rectifier circuits, voltage multiplier circuits, Van de Graff generators, electrostatic generators, examples - generation of alternating voltages, testing transformers, cascaded transformers, resonant transformers, examples - impulse voltages, Standard lightning and switching surge and associated parameters and their corrections, impulse voltage generator circuits, Marx circuit, operation, design and construction of impulse generators, examples - impulse current generator - control systems	07
5.	**Measurement of high voltages :** High direct voltage measurement, peak voltage measurements by spark gaps, sphere gaps, reference measuring systems, uniform field gaps, rod gaps, factors affecting sphere gap measurements, examples - electrostatic voltmeters - ammeter in series with high ohmic resistors and high ohmic resistor voltage dividers - generating voltmeters and field sensors - the measurement of peak voltages, the Chubb–Fortescue method, high- voltage capacitors for measuring circuits - voltage dividing systems and impulse voltage measurements, digital recorders, errors inherent in digital recorders	06
6.	**Over voltages, testing procedures and insulation coordination :** The lightning mechanism, energy in lightning, nature of danger laboratory high-voltage testing procedures and statistical treatment of results, examples - insulation coordination, insulation level, statistical approach to insulation coordination, correlation between insulation and protection levels - modern power systems protection devices, M O A – metal oxide arresters	04
7.	**Non-destructive insulation test techniques :** Measurement of d.c. resistivity - dielectric loss and capacitance measurements, the Schering bridge, current comparator bridges, Tan Delta measurement, null detectors - partial-discharge (PD) measurements, the basic PD test circuit, PD currents, PD measuring systems within the PD test circuit, measuring systems for apparent charge, sources and reduction of disturbances, other PD quantities, calibration of PD detectors in a complete test circuit, digital PD instruments	05
8	**High voltage testing:** Testing of insulators and bushings, testing of isolators and circuit breakers Testing of cables, testing of transformers - testing of surge diverters - radio interference measurements - design, planning and layout of high voltage laboratory	04

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Course Outcome:

After learning the course the students should be able to

1. Understand the basic generation and measurement of High voltage and High current for testing purposes
2. Comprehend Breakdown phenomenon in air, solid and liquid Insulation
3. Test high voltage electrical Equipment with various testing devices.

Teaching & Learning Methodology: -

Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

Reference Books:

1. Kuffel, E., Zaengl W.S., Kuffel J., "High Voltage Engineering: Fundamentals" Butterworth-Heinmann (A division of Reed Educational & Profession Publishing Limited), 2nd Edition, 2000.
2. Naidu M. S. and Kamaraju V., "High Voltage Engineering", fourth Edition, Tata McGraw- Hill Publishing Company Limited, New Delhi, 2009.
3. Rakosh Das Begamudre, "High Voltage Engineering, Problems and Solutions", New Age International Publishers, New Delhi, 2010.
4. Dieter Kind, Kurt Feser, "High Voltage Test Techniques", Reed educational and professional publishing ltd. (Indian edition), New Delhi-2001
5. M. Khalifa, "High Voltage Engineering-Theory and Practice", Marcel Dekker, Inc. New York and Basel,1990.
6. Hugh M. Ryan, "High Voltage Engineering and Testing", 2nd edition, The Institution of Electrical Engineers, London, United Kingdom, 2001.
7. Wadhwa C.L., "High Voltage Engineering", third edition, New Age publishers, New Delhi, 2010.

List of Experiments:

1. Testing of transformer oil according to IS:6792
2. Testing of solid insulation with tape electrodes
3. Generation High D.C. Voltages and measurement through sphere gaps
4. Generation High A. C. voltages and measurement through sphere gaps
5. Generation of High A. C. voltages through cascaded transformers
6. Impulse voltage generation through Marx generator
7. Impulse voltage generation though simulation
8. Trace the field through electrolytic tank
9. Generation and visualization of corona in corona cage
10. Capacitance and loss factor measurement
11. A report on visit to high voltage laboratory

List of Open Source Software/learning website: Open source software:

1. Finite Element Method Magnetics FEMM
2. LTSpice for circuit simulation,
3. KiCAD for CAD application

Web-based tools for design:

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1. http://www.fairchildsemi.com/support/design-tools/power-supply-webdesigner/
2. http://www.ti.com/lsds/ti/analog/webench/overview.page

Circuit Lab:

1. https://www.circuitlab.com/editor/

Open source Math Tools:

1. http://maxima.sourceforge.net/
2. http://www.sagemath.org/
3. http://www.scilab.org/
4. http://www.gnu.org/software/octave/

Online Experiment Portal

1. http://vlab-ee1.iitkgp.ernet.in

Learning website

1. http://www.electrical-engineering-portal.com/
2. http://nptel.iitm.ac.in/courses.php

Standards

1. "IEEE Standard Techniques for High-Voltage Testing", 6th edition, IEEE Std. 4-1978.
2. "High-voltage test techniques, Part 1: General definitions and test requirements", IEC 60060-1, 1989.
3. "High Voltage Test Techniques, Part 2: Measuring Systems", IEC Publication 60060-2, 1994.
4. "High Voltage Test Techniques, Part 3: Measuring Devices", IEC Publication 60060-3, 1976.
5. "High Voltage Test Techniques, Part 4: Application Guide for Measuring Devices", 1st ed., IEC Publication 60060-4, 1977.
6. Indian Standard specifications for High Voltage test techniques", Bureau of Indian Standard, IS 2071, New Delhi, 1991.

Active learning Assignments (AL) :

Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to SSIU.

(Prof. V.B. Babaria)

5

SWARNIM STARTUP AND INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TE CHNOLOGY

ELECTRICAL ENGINEERING

UTILIZATION OF ELECTRICAL ENENRGY AND TRACTION

SUBJECT CODE: 23050605

B.E. 6th SEMESTER

Type of Course: Engineering Science (Power Electronics)

Prerequisite: NA

Rationale: This subject assumes importance in view of the fact that a technician has to work in a wide spectrum of activities wherein he has to make collections from alternative schemes from technical and economic considerations i.e. to plan and design using basic principles and handbooks, to select equipment, processes and components in different situations.The curriculum has been designed keeping the above objectives in view.

Besides giving him basic knowledge in the topics concerned, attempts have been made to ensure that the knowledge acquired is applied in various fields as per his job requirements. To orient the subject matter in the proper direction, visits to industrial establishments are recommended in order to familiarize the students with the new developments in different areas.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	0	3	70	30	0	0	0	0	100

Content:

Sr. No.	Content	Teaching Hours	% Weight age
1.	**Electric Drives:** • Advantages of electric drives, Characteristics of different mechanical loads, Types of motors used in electric drive, • Electric braking, Plugging, Rheostat braking, Regenerative braking, Methods of power transfer by direct coupling by using devices like belt drive, gears, pulley drives etc. • Examples of selection of motors for different types of domestic loads • Selection of drive for applications such as general workshop, textile mill, paper mill, steel mill, printing press, crane, lift etc. Application of flywheel. • Specifications of commonly used motors e.g. squirrel cage, slip ring induction motors, AC series motors, FKW motor	8	15-30
2.	**Electric Heating:** • Advantages of electrical heating, Heating methods • Resistance heating – direct and indirect resistance heating, electric ovens, their temperature range, properties of resistance heating elements, domestic water heaters and other heating appliances and thermostat control circuit • Induction heating; principle of core type and coreless induction furnace • Electric arc heating, direct and indirect arc heating, construction, workingand applications of arc furnace • Dielectric heating, applications in various industrial fields • Infra-red heating and its applications • Microwave heating, Simple design problems of resistance heating element	9	10-20

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3.	**Electric Welding:** • Advantages of electric welding • Welding methods, Principles of resistance welding, types – spot, projection seam and butt, welding and welding equipment used • Principle of arc production, electric arc welding, characteristics of arc,carbon arc, metal arc, hydrogen arc welding and their applications • Power supply required • Advantages of using coatedelectrodes, comparison between AC and DC arc welding, welding controlcircuits, welding of aluminium and copper, Introduction to TIG, MIG welding	8	10-15
4.	**Electrolytic Processes:** • Need of electro-deposition, Laws of electrolysis, process of electro-deposition - clearing, operation, deposition of metals, polishing, buffing • Equipment and accessories for electroplating, Factors affecting electro-deposition • Principle of galvanizing and its applications, Principle of anodising and its applications • Electroplating on non-conducting materials • Manufacture of chemicals by electrolytic process and electrolysis process	6	10-15
5.	**Electric Traction:** • Electric traction, Advantages of electric traction • Different systems of electric traction, DC and AC systems, diesel electric system, types of services – urban, sub-urban, and main lines and their speed-time curves • Different accessories for track electrification such as overhead capacitor wire, conductor rail system, current collector-pantograph • Factors affecting scheduled speed • Electrical block diagram of an electric locomotive with description of various equipment and accessories, Types of motors used for electric traction, Starting and braking of traction motors • Introduction to EMU and metro railways	8	20-30

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (Revised Bloom's Taxonomy)				
Remembrance R Level	**Understanding U Level**	**Application A Level**	**Analyse N Level**	**Evaluate E Level**
20%	30%	20%	10%	20%

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Generation and Utilization of Electrical Energy by S. Sivanagaruju, Pearson
2. Art and Science of Utilization of Electrical Energy by H.Partap, Dhanpat Rai & Sons
3. Utilization of Electrical Energy by J. B. Gupta, Kataria Publications
4. AText Book of Electrical Power by Dr. S. L. Uppal, Khanna Publications
5. Modern Electric Traction by H.Partap, Dhanpat Rai & Sons
6. Utilization of Electrical Energy by O. S. Taylor, Pitman Publications
7. Generation, Distribution and Utilization if Electrical Power by C. L.Wadhwa, Wiley Eastern

Course Outcome:

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

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After learning the course the students should be able to:

1. Understand the power electronics technology in efficient utilization of electrical power
2. Apply power electronics technology in efficient utilization of electrical power
3. Analyze effective utilization of Power Electronic Technologies in Electrical Traction.
4. Evaluate the use of Power Electronic Technologies in various process control.
5. Create lighting system using LED Technologies.

List of Open Source Software/learning website:

1. http://www.vssut.ac.in/lecture_notes/lecture1424084684.pdf
2. http://www.ene.ttu.ee/elektriajamid/oppeinfo/materjal/AAV0020/4Drives_Lehtla.pdf
3. ftp://ftp.elet.polimi.it/users/Massimo.Ghioni/Power%20Electronics%20/Motor%20control/motor%20control%20overview/INTRODUCTION%20TO%20ELECTRICAL%20DRIVES.pdf
4. http://www.nptel.ac.in/courses/108105061/Illumination%20%20Engineering/Lesson-05/pdf/L-5(NKK)(IE)%20((EE)NPTEL).pdf
5. http://www.lrc.rpi.edu/resources/publications/pdf/illuminationfund.pdf
6. http://uotechnology.edu.iq/dep-production/lectures/WL.pdf
7. http://www.elektra.eu/pdf_en/content/elektra_guide_book.pdf
8. https://tstuition.wikispaces.com/file/view/6+-+Electrolysis+and+Its+Uses.pdf
9. http://www.nrel.gov/docs/fy06osti/40605.pdf
10. http://sudaup.org/Duda_course/18-Refrigeration%20and%20air%20conditioning.pdf
11. http://www4.hcmut.edu.vn/~nvnho/Download/PE/A-Seminar-A%20review%20of%20Active%20Power%20Filter.pdf
12. http://www.sciencedirect.com/science/article/pii/S0378779605000672#

ACTIVE LEARNING ASSIGNMENTS:

Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work. The faculty may allocate chapters or part of chapters to groups of students so that the entire syllabus to be covered. The power-point slides may be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide.

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HOD (Elect)

SWARNIM STARTUP & INNOVATION UNIVERSITY
SWARRNIM INSTITUTE OF TECHNOLOGY
DEPARTMENT OF ELECTRICAL ENGINEERING
ADVANCE MICROCONTROLLER
SUBJECT CODE: ________
B.E. 6th SEMES TER

Type of course: Engineering (Elective)

Prerequisite: Analog and Digital Electronics, Basics of microprocessor and microcontroller

Rationale:

The subject is focuses on the study of advanced microcontroller along with the use of Electrical components. It also briefs the students about interfacing of memory and various I/O devices like A to D converter, D to A converter, LED, LCD to advanced microcontrollers. The students learn the Programming language (Embedded C) used for electrical system. Students will be able to use the advanced fast microcontroller in electrical engineering related fields like Power system protection, instrumentation, power electronics, Electrical Drives and control of Electrical Equipments.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Evaluation Scheme			
Th	Tu	Pr		Internal		External	Total
				Th	Pr	Th	
3	0	2	4	30	50	70	150

Legends: Th-Theory; **Tu** – Tutorial; **Pr** - Practical; **Cr**– Credit

Content:

Sr. No.	Content	Total Hrs
1.	Advanced concepts in 8051 architecture: Review of 8051 architecture, concept of synchronous serial communication, SPI and I2C communication protocols, study of SPI port on 89LP 51RD2, study of SAR ADC/DAC MCP3304 / MCP 33, interfacing concepts for SPI based ADC/DAC, study of watchdog timer, study of PCA timer in different modes like capture mode, PWM generation mode, High speed output toggle mode Embedded 'C' programming for the above peripherals	15

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2016

2.	Introduction to ARM CORTEX M profile: CORTEX M0 and M4 cores, Harvard and Von Neumann architectures, CPU Registers, CPU Operating Modes, Thumb-2 Instruction Set, Memory Map, Bus Interface, bit bending , interrupt handling ,NVIC(Nested Vectored Interrupt Controller), system tick timer, Debug system	5
3.	Introduction to STM32F4xx architecture: Features of STM32F4XXDSC, Memory and bus architecture, Multilevel AHB bus matrix, Memory organization, Memory map, NVIC Operation Exception Entry And Exit , Reset and Clock Circuit	5
4.	Advanced concepts in Embedded 'C' programming: Pointers, structures, unions, pointers to structures, pointers to functions, addressing mechanism for memory mapped registers, enumerators, Interrupt Handlers Embedded software architecture: Round robin architecture, Round robin with interrupt architecture	7
5.	STM32F4 PERIPHERALS & PROGRAMING GPIO, General Purpose Timers, GPIO :Introduction, Main Features , Function Description, Registers, Basic timers (TIM6&TIM7): introduction, main features, functional description, registers Embedded C Programming for GPIO and Timers	10

Reference Materials:

1. The 8051 Microcontroller and Embedded Systems Using Assembly and C, By Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay
2. David E. Simon. "An Embedded Software Primer" Addision Wesley Pearson Education, 1999.
3. "The Definitive Guide to ARM® CORTEX®-M3 and CORTEX®-M4 Processors (Third Edition)", By *Joseph Yiu,* Newnes, Elsevier
4. "The insider's guide to the STM32 ARM based Microcontroller", (www.hitex.com)
5. Datasheet, programming and user reference manual of STM32F4xx (www.st.com)
6. "The Designer's Guide to the Cortex-M Processor Family: A Tutorial Approach", By Trevor Martin, Newnes, Elsevier
7. Datasheet of 89V51RD2 (www.nxp.com, www.atmel.com)
8. Datasheet MCP3304/MCP4822 (www.microchip.com)

Learning Outcome:

After learning the course the students should be able to:

1. Understand how microcontroller and its peripherals function.
2. Interface to external peripherals
3. Program an embedded system in assembly and C
4. Design, implement and test a single-processor embedded systems for real-time applications
5. Optimizing embedded software for speed and size for industrial applications.

List of Experiments:

1. Introduction to Integrated Development Environment KEIL Micro Vision IV
2. Programming of PCA Timer for 8-bit PWM Generation
3. Programming of PCA timer for Variable frequency square wave generation
4. Programming of PCA Timer for Frequency measurement and display on LCD using Capture mode.
5. Programming of SPI port for Interfacing with ADC MCP3304
6. Programming of SPI port for interfacing with DAC MCP48227. Programming of Watchdog Timer
8. Introduction to KEIL Microvision IV MDK-ARM IDE
9. Programming of GPIO port with LED toggling and key interface

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HOD(EC)
2011

10. Programming of Base timer for accurate delays
11. Introduction to auto code generation for STM32F4 target using MATLAB Toolbox and Simulink

Design based Problems (DP)/Open Ended Problem:

Implementation of embedded system for industrial application (e.g. instrumentation, control, automation etc) using any of the 16-bit or 32-bit microcontroller available in the market.

Major Equipment: Kit for advanced 8051 controller and advanced 16bit/32 bit controllers, µVISION2/3/4IDE

List of Open Source Software/learning website: NPTEL, www.infineon.com,www.silabs.com

ACTIVE LEARNING ASSIGNMENTS: Preparationof power-point slides includes videos, animations, pictures, graphics for better understanding theory and practical work.The faculty will allocate chapters/parts of chapters to groups of students hence entire syllabus to be covered.The slides should be share in

the College/ Institute, along with the names of the students, faculty, departmentand College on the first slide.

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HOD(Elect)
25/6

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING
CONTROL OF ELECTRICAL DRIVES
CODE: 23050607
B.E. VITH SEMESTER

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives: -

Today's industrial and domestic loads demands precise and smooth variable speed control. The development of compact thyristor power converters has made this possible by smooth speed control of both AC and DC motors which are employed for several applications such as DC/AC drives, Vehicles and renewable energy. This course enables to develop the basics of electric drives and maintain different types of DC in industries. The competency in this area is highly required in diploma pass outs working in most of the industries since these industries employ large number of motors and drives and their smooth operation and maintenance requires lot of competent man power. Thus this course is must for students who want to work in industries.

Prerequisites: - DC machine and Transformer and Power Electronics

Contents:

Sr. No.	Topics	Teaching Hrs. (36 Hrs.)
1.	**Introduction:** • History Of Dc Drive –Electronic Control –Solid State Control • State Of Art Of Dc Drive • Block Diagram Of Drive – Part Of Electrical Drive	05

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2.	**Dynamics of Electrical Drives :-** Types of Load-Quadratal diagram of speed –torque characteristics –Types and Characteristics of load torque – Dynamics of motor- load combination – steady state & transient stability of an electrical drive – Determination of moment of inertia.	07
3.	**Thyristor controlled D.C. drives:** Single-phase series D.C. motor drives, three phase drives, dual converters, reversible drives, speed regulation by armature current controlled, speed regulation by armature voltage controlled, speed regulation of D.C. series and shunt motor, VDR method of speed regulation of shunt motor with change in supply voltage, D.C. chopper speed control. Brush less drive.	07
4.	**Thyristor controlled A.C. drive:** Induction motor: various scheme of speed control and constant frequency operation, Variable frequency operation, operation on non- sinusoidal voltage source, speed control by chopper, synchronous motor control, comparison between A.C & D.C. drive, Choice between A.C. & D.C. drives.	07
5.	**Dynamic modeling and Vector control:-** Dynamic model of induction motor: ABC reference frame, Arbitrary reference frame, stationary reference frame, rotating reference frame; Principle of Vector control, Field oriented control: Stator Flux Control and Rotor Flux Control; Direct torque control; Comparison of FOC and DTC, Introduction to Synchronous motor and BLDC machine drive.	07
6.	**Applications of Electric Drives**:- Introduction to Solar and battery powered Drives; Introduction to traction Drives; Servo motor drive requirement – control and implementation	06

Course Outcome:

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

After learning the course the students should be able to:

1. Select a drive for a particular application based on power rating.
2. Select a drive based on mechanical characteristics for a particular drive application.
3. Operate and maintain solid state drives for speed control of DC and AC machines.
4. Operate and maintain solid state drives for speed control of various special electrical machines.

Teaching & Learning Methodology: -

Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

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Reference Books:

1. P.S. Bimbhra, "Power Electronics", Khanna Publishers, New Delhi, 2012.
2. Muhammad H. Rashid, "Power Electronics - Circuits, Devices and Applications", Prentice Hall of India, 3rd ed., 2003.
3. M D Singh and K B Khanchandani, "Power electronics", TMH, New Delhi, 2nd ed., 2007.
4. Bimal K. Bose, "Modern Power Electronics and AC Drives", Pearson Education
5. Vedam Subrahmanyam, "Electric Drives", TMH (I), Second Edition,
6. R.Krishnan, "Electric Motor Drives–Modeling, Analysis and Control" PHI

List of Experiments:

1. To study the fundamental and block diagram of Electric drive.
2. To study different methods of speed control of D.C. Motor.
3. To study and simulate 1- Φ Semi Control of D.C. separately excited Motor.
4. To study and simulate 1- Φ Fully Controlled converter of separately excited Motor.
5. To study the control techniques used in D.C. chopper
6. Speed control of DC separately excited motor with phase controlled converter or DC-DC converter.
7. To study chopper control of D.C. Motor for motoring and generating control.
8. To study and simulate AC voltage controller based speed control of AC motor.
9. Performance of 1-phase bridge inverter with R and R-L load
10. Simulation of 1-phase bridge type cycloconverter in MATLAB

Design based Problems (DP)/Open Ended Problem:

Faculty teaching the subject shall provide an application oriented course project. The students can work in a group to design a power electronic converter and its control scheme to target different applications.

Major Equipment:

Power semiconductor devices, power electronic converter kits, CRO/DSO, choke coil, load bank, voltage and current probes, simulation tools like MATLAB, PSIM etc.

List of Open Source Software/learning website:

http://nptel.iitm.ac.in/coursecontents_elec.php ocw.mit.edu/courses/electrical.../6-334-power-electronics-spring-2007

Active learning Assignments (AL) : Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to SSIU.

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

HIGHWAY ENGINEERING

CODE: _____

B.TECH.SEM-5

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	0	2	5	4	30	50	70		150

Objectives: -

- To provide a coherent development to the students for the courses in sector of Engineering like Transportation & Traffic Engineering etc.
- To present the foundations of many basic Engineering tools and concepts related to Highway Engineering.
- To give an experience in the implementation of engineering concepts which are applied in field of Transportation Engineering.
- To involve the application of scientific and technological princip analysis, design and management to highway engineering.

Prerequisites: - Basic knowledge and terminologies related to Transportation engineering.

Course outline: -

Sr.No.	Course Contents	Number of Hours
Unit-1	Highway Introduction, Planning & Alignment	05
Unit-2	Highway Geometric Design	09
Unit-3	Highway Constructions and related Materials	06
Unit-4	Design of Highway Pavements	06
Unit-5	Highway Drainage & Maintenance	04
Unit-6	Highway Economics & Finance	03
Unit-7	Traffic Engineering	06

Dr. MN. Patel

I/c Head
HOD Civil

Course outcome: -

On completion of this module, the learner will be able to:

- Design a flexible pavement for a highway
- Select a suitable alignment for a highway
- Evaluate a highway link in terms of its impact on the existing network
- Forecast future traffic flows along highway links
- Demonstrate an understanding of the appraisal process for a highway
- Analyze highway links and intersections in terms of their capacity
- Geometrically design the alignment of a highway
- Plan an earthworks programme
- Describe different highway structures, the methods by which they are analysis and constructed
- Design a highway drainage system

Content:

Sr.No.	Topics	Teaching Hrs.
Unit-1 Highway Introduction, Planning & Alignment	Highway planning in India, Development, Rural and urban roads, Road departments in India, Road classification, Road authorities i.e. IRC, CRRI, NHAI, NHDP, Reconnaissance, Aerial surveys, Location surveys, Location of bridges, Problems in rural and urban areas. Highway drawings & reports Highway project preparation	05
Unit-2 Highway Geometric Design	Topography and physical features, Cross section elements like carriageway width, formation width, right of way, etc., friction, Light reflecting characteristics, roughness, camber, sight distances, horizontal alignment, design speed, minimum radius, super-elevation, transition curve, gradients, design of summit and valley curves.	09
Unit-3 Highway Construction s and related Materials	Construction of various types of roads, Joints in cement concrete pavements, Aggregates and their types, physical and engineering properties, Fillers, Bitumen, Characteristics, Emulsions and cutbacks, Basic tests on all materials.	06
Unit-4 Design of Highway Pavements	Design of flexible (G.I. method and CBR method using million standard axles) and rigid pavements (Fatigue concept of pavement design), Maintenance of pavements	06
Unit-5 Highway Drainage & Maintenance	Importance of highway drainage, Pavement failures, strengthening of existing pavements, Surface and sub-surface drainage arrangements, sketches and design	04
Unit-6 Highway Economics & Finance	Financing of road projects, administration of roads, PPP models, Road safety audit, Methods of economic evaluation of highway projects	03
Unit-7 Traffic Engineering	Road user characteristics, vehicular characteristics, traffic flow characteristics, speed, traffic volume studies, parking studies - definition, purpose, types, survey methods. Accident studies - purpose, types, causes, collision diagram, condition diagram, preventive measures. Traffic control devices like pavement marking, signs, signals. Traffic management, various types of intersection and their design concept.	06

Dr. M. N. Patil

I/c Mam
HOD civil

Teaching & Learning Methodology: - Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

Practical Exercises:

Sr. No.	Unit No.	Practical Exercises	Teaching Hours
		Test on Aggregates	
1.	3	Aggregate Shape Test	02
2.	3	Aggregate Impact Test	02
3.	3	Los Angeles Abrasion Test	02
4.	3	Specific Gravity and Water Absorption Test	02
		Test on Bitumen	
5.	3	Penetration Test	02
6.	3	Ductility Test	02
7.	3	Softening Point Test	02
8	3	Specific Gravity Test	02
9.	3	Viscosity Test	02
10.	3	Flash & Fire Point Test	02
		Test on Subgrade soil	
11.	3	California Bearing Ratio Test	02
		Test on Mix Design	
12.	3	Marshal Stability Test	02

Books Recommended:

1. Khanna, S.K. & Justo, C.E.G., Highway Engineering, NemChand & Bros, Roorkee (U.A).
2. Kadiyali, L.R., Traffic Engineering & Transport Planning, Khanna Publishers, New Delhi.
3. Kadiyali, L.R. & Lal, N.B., Principles & Practices of Highway Engineering, Khanna Publishers, New Delhi.
4. Sharma, S.K., Principles, Practice and Design of Highway Engineering, S. Chand & Co., New Delhi.
5. IRC – 37 **"Guidelines for Design of flexible Pavements"**, IRC, New Delhi, 2001.
6. IRC – 67 "Code **of Practice for Road Signs"**, IRC, New Delhi – 2001. 30
7. IRC: 58, 2002: **"Guidelines for the Design of Plain Jointed Rigid Pavements for Highways"**, IRC, N. Delhi, December, 2002.
8. IRC:70, 1977: **"Guidelines on Regulation and Control of Mixed Traffic in Urban Areas"**
9. IRC:106, 1990: **"Guidelines for Capacity of Urban Roads in Plain Areas"**

Web Resources:

1. http://www.cdeep.iitb.ac.in/nptel
2. http://www.nptel.iitm.ac.in

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

ENVIRONMENTAL ENGINEERING

SUBJECT CODE: _____

B.TECH SEM - 5

Type of course: Civil Engineering core subject

Prerequisite: The students should have studied the basics of Environmental Engineering

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	0	2	4	4	30	50	70		150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction to Environment:** Components of Environment, Types of microbes, their growth and role in environment.	02	5
2	**Quality and Quantity of Water for supply to towns/Cities:** Sources of water, Assessment of domestic and industrial requirement, Impurities in water, Indian standards for drinking water, Water borne diseases and their control. The water (prevention and control of pollution) Act – 1974.	08	20

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3	**Characteristics of Wastewater:** Physical, chemical and biological characteristics of domestic and industrial wastewaters. BOD and COD, study of characteristics of several industrial wastewaters like textile, chemical dairy and pharmaceutical wastewaters. Indian Standards for effluent to be disposed in receiving water body like rivers, estuaries, lakes, sea and oceans. Disposal of treated wastewaters (i) into inland surface waters; (ii) into oceans; (iii) into public sewers (iv) into estuaries and (v) onto land. Effect of organic pollution on Stream, river water quality, and self purification, DOSAG Curve.	08	20
4	**House Drainage:** Principles of house drainage, pipes and traps, Classification of traps: nahni trap, gulley trap, interception trap, grease trap, sanitary fitting, system of plumbing, house drainage plan for buildings.	06	15
5	**Solid Waste Management:** Quantity composition and characteristics of solid wastes. Classification of solid wastes. Hazardous solid wastes, Biomedical solid wastes, Typical generation rate for solid wastes, factors affecting the generation rate. Estimation of quantity of solid waste, Onsite handling, storage and processing, collection services, types of collection systems. Determination of vehicle and labor requirements, collection routes, transfer stations, location of transfer stations, transfer means and methods, solid waste processing techniques, Mechanical volume reduction, Thermal volume reduction, manual component separation. Ultimate disposal, land filling with solid waste, Design of landfills.	10	20
6	**Air Pollution:** Definition, Composition of atmospheric air, Classification and sources of air pollutants. Effects of air pollution on human, plant and material, Air pollution control methods, equipment and safety. Salient features of the Air (Prevention and control of pollution) Act – 1981.	04	10
7	**Noise Pollution:** Measurement of sound, Sources, Effects and control of noise pollution.	02	5
8	Introduction to: "The environment (Protection) Act – 1986.	02	5

Reference Books:

1. H.S. Peavy, D.R. Rowe and G. Tchbanoglous, Environmental Engineering, McGraw Hill International Edition.
2. M. L. Davis, Water and waste water Engineering, Mc Graw Hill education (India) Pvt. Ltd. 2013 edition.
3. A. P. Sincero and G.A. Sincero, Environmental Engineering, Prentice Hall of India, New Delhi.
4. G. Tchabanoglous, Solid Waste Treatment and Disposal, McGraw Hill Pub.
5. G.S. Birdie and J.S. Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai
6. Publishing Co. New Delhi.
7. H.C. Parkins, Air Pollution, McGraw-Hill Pub.
8. J.A. Salvato, Environmental Sanitation, Wiley Interscience.

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9. L.W. Canter, Environmental Impact Assessment, McGraw Hill Pub.
10. M.L. Davis and D.A. Cornwell, Introduction to Environmental Engineering,
11. McGraw Hill International edition.
12. 10. Metcalf and Eddy,(Revised by G. Tchobanoglous Wastewater Engineering:
13. Treatment, disposal Reuse, Tata-McGraw Hill, New Delhi.

Course Outcome:

After learning the course the students should be able to:

1. Understand the role of microorganisms in various components of environments
2. Understand the quality and characteristics of waste water
3. Design and prepare drainage plan of buildings
4. Understand and design solid waste management system
5. Understand various types of pollution
6. Understand various environmental Acts.
7. Determine various water/air quality parameters

List of Experiments:

1. Introduction to Equipment in Environmental Engineering Laboratory
2. Introduction to Standards, Sampling, Collection and Preservation of samples
3. MPN Test
4. Determination of pH and conductivity for water and wastewater
5. Determination of Solids(suspended, dissolved and settleable)
6. Determination of Acidity and Alkalinity
7. Determination of hardness and residual chlorine
8. Determination of fluoride and nitrate
9. Determination of chloride and residual chlorine of water samples
10. Ambient air quality measurement using High Volume sampler
11. Exhaust gas analysis for air pollutants
12. Measurement of noise at different sources using sound meter
13. Characterization of municipal solid waste (physical and chemical)

Design based Problems (DP)/Open Ended Problems:

Below mentioned problems are for reference only. Similar problems may be developed by individual teachers.

1. Design the house drainage system for a plan of proposed buildings and draw drainage plan
2. Write detailed description of decided court cases related to environmental pollution in & Gujarat or any other state.
3. To lay out collection routes for the domestic and commercial area from the map of area and other available data like container size, container utilization factor collection frequency, collection vehicle capacity etc.
4. Develop the design of landfill for a particular Town/Area.
5. Students can drive around his community and identify the principal types of solid waste collection system that are in use.
6. A new residential area composed of five hundred single family dwellings is being developed.
7. Decide truck size and no. of trips must be made for the area from the given data.
8. Decide layout collection routes for the commercial area from given data and map of area.

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Major Equipment:

1. pH meter
2. TDS meter
3. High volume sampler
4. Exhaust gas analyzer
5. Ion selective meter for Nitrate, Fluoride and Chloride estimation

List of Open Source Software/learning website:

1. ocw.mit.edu
2. nptel.ac.in

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

THEORY OF STRUCTURE-II

CODE: _____

B.TECH SEM - 5

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	1	-	5	4.5	30	50	70		150

Objectives: -

This subject is conceptual applications of principles of mechanics of rigid and deformable bodies in Engineering.

Course outline: -

Sr.No.	Course Contents	Number of Hours
1	Influence line diagram	08
2	Slope Deflection Method	08
3	Moment Distribution Method	08
4	Influence line diagrams	08
5	Matrix Methods:	10

Learning Outcomes:-

After learning the course the students should be able to:

1. Apply equilibrium and compatibility equations to determine response of statically determinate and indeterminate structures.
2. Determine displacements and internal forces of statically indeterminate structures by classical, iterative and matrix methods.
3. Determine internal forces and reactions in determinate and indeterminate structures subjected to moving loads.

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Content:

Sr. No.	Topics	Teaching Hrs.
1	**Influence line diagram:** ILD for statically determinate beams- I.L.D of support reaction, shear force and moment bending moment for beams subjected to u.d.l and several point loads, criteria for maximum effects, ILD for statically determinate trusses, forces in members for u.d.l and point loads. ILD for statically indeterminate beams: Muller-Breslau's principle, steps for obtaining I.L for reaction and internal forces in propped cantilever and continuous beams, qualitative I.L for rigid jointed Structures having higher degree of statically indeterminacy.	08
2	**Slope Deflection Method:** Analysis of continuous beams for various loading including settlement/ rotation of support, analysis of simple portal frame with Sway.	08
3	**Moment Distribution Method:** Analysis of continuous beams & frames including sway, use of symmetry of structure up to two storeyed / two bay frames.	08
4	**Energy Principles:** Castigliano's theorems , computation of displacements of statically determinate beams, trusses and frames by unit load method, analysis of indeterminate structures – beams, trusses, frames.	08
5	**Matrix Methods:** Types of skeletal structures, Internal forces and deformations. Introduction and applications of stiffness method to analyze beams, Trusses and plane frames by system approach. Introduction and applications of Flexibility method to analyze beams, Trusses and plane frames by system approach.	10

Teaching & Learning Methodology: - Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

Books Recommended

1. Junarkar S. B. & Shah H. J.; Mechanics of Structures Vol-II; Charotar publishing house,Anand

2. Wang C. K.; Intermediate Structural Analysis; Tata McGraw Hill book Company, NewDelhi

3. Gere & Weaver; Matrix Analysis of framed structures, CBS Publications

4. Ryder G.H.; Strength of Materials; Mcmillan

5. Gere & Timoshenko; Mechanics of Materials; CBS Publishers & Distributors, Delhi

6. Hibbler R C; Structural Analysis; Pearson Education

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E-Resources:

http://nptel.iitm.ac.in

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SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

GEOTECHNICAL ENGINEERING

CODE: _____

B.TECH.SEM-5

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	0	2	5	4	30	50	70		150

Objectives: - Geotechnical Engineering is very fundamental subject consisting of determination of various soil parameters theoretically and experimentally based on laws of mechanics. Any civil engineering structure needs strong and stable foundation which depends on proper understanding of soil behaviour, determination and interpretation of soil parameters, determination of stresses in soil. The design of any foundation system is based on understanding of soil parameters and its implication based on through interaction with type of structure. The course provides the students basic knowledge on soil properties, testing procedures, suitability of test and analytical solutions necessary for design and behaviour of soil.

Prerequisites: - Basic knowledge and terminologies related to Geotechnical engineering.

Course outline: -

Sr. No.	Course Contents	Number of Hours
Unit-1	**Compaction**	**09**
Unit-2	**Consolidation of Soils**	**09**
Unit-3	**Shear Strength of Soil**	**07**
Unit-4	**Stability of Slopes**	**08**
Unit-5	**Stress Distribution of Soils**	**08**
Unit-6	**Earth Pressure**	**08**

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Course Outcome:

After learning the course the students should be able to:

1. This course will provide good understanding of various index (preliminary) and engineering properties of soil, its determination through various methodology and application for design of shallow and deep foundation systems for various civil engineering structures.

2. The course covers various topics like compaction, shear strength, consolidation, earth pressure, stress distribution which gives insight to students to analyise soil parameters based on application and need of project site.

3. The course will also develop understanding about soil testing procedures, experimentation techniques and related issues. Simulation of mechanics on soil as a material to understand its behaviour before failure and estimating its permissible values.

4. The course also discusses details of foundations, its selection procedures as per soil conditions and various modifications available for various degrees of loads.

Content:

Sr.No.	Topics	Teaching Hrs.
Unit-1 Compaction	Definition, Theory of compaction, Factors affecting compaction, Laboratory compaction tests, Effect of compaction on soil properties, Placement water content, Placement layer thickness, Field control of compaction, Proctor"s needle, Methods of compaction used in field.	09
Unit-2 Consolidation of Soils	Compressibility of soils, Definitions and mechanism of consolidation, Spring analogy, Void ratio and effective stress relation, Related indices, Assumptions of Terzaghi's one dimensional consolidation theory, Time factor, One dimensional consolidation tests, Laboratory and theoretical	09
Unit-3 Shear Strength of Soil	Mohr"s strength theory, Mohr- coulomb"s strength theory, Modified Mohrcoulomb"s theory, Direct shear test, Unconfined compression test, lab. Vane shear test, Introduction to triaxial compression test, Shear tests based on drainage conditions.	07
Unit-4 Stability of Slopes	Infinite and finite slopes, factor of safety, type of slope failure, stability of infinite slopes, finite slopes forms of slip surfaces, limit equilibrium method and critical stage instability analysis, effects of tension crack and submergence, C-analysis-method of slices, taylor's stability no., use of Bishop's method.	08
Unit-5 Stress Distribution of Soils	Causes of stress in soil, geostatic stress, Boussinesque's equation, stress distribution diagrams, New-mark's influence chart Westergard's equation, contact pressure, stresses due to triangular and other loadings.	08

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Unit-6 Earth Pressure	Types of lateral earth pressure, Rankine's and Coulomb's earth pressure, theory and their application for determination of lateral earth pressure under different conditions, Rebhann's and culmmnn's	**08**

Teaching & Learning Methodology: - Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

Practical Exercises:

Sr. No.	Practical Exercises	Teaching Hours
1.	Proctor Compaction Test	**02**
2.	Consolidation /Oedometer test	**02**
3.	Direct Shear Test	**02**
4.	Unconfined Compression Test	**02**
5.	Demonstration of Triaxial test	**02**
6.	Auger boring/sampling	**02**
7.	Free swill and swell potential	**02**

Books Recommended:

1. Arora, K.R., Soil Mechanics & Foundation Engineering, Standard Publicaiton, New Delhi.
2. Punamia, B.C., Soil Mechanics & Foundation Engineering; Laxmi Publication Pvt. Ltd., Delhi.
3. VNS Murthy, Soil Mechanics & Foundation Engineering, SaiKripa Technical Consultants, Bangalore.
4. Shroff, A. V., Shah D. Fratta, J. Aguettant, and L. R. Smith, Soil Mechanics Laboratory Testing, Boca Raton, CRC Press, USA, 2007.
5. D. L., Soil Mechanics & Geotechnical Engineering, Oxford & IBH, Delhi.
6. Singh Alam, Soil Engineering, Agion Publishers, Jodhpur.
7. Purshottam Raj, Geotechnical Engineering, Tata McGraw Hill Publication.
8. Purushothama, P. Raj, Soil Mechanics and Foundation Engineering, Pearson
9. Education.
10. Singh, Alam, Soil Mechanics & Foundation Engineering, CBS Publishers &
11. Distributors, New Delhi.
12. Taylor, D.W., Fundamentals of Soil Mechanics, Asia Publishing House, Mumbai.
13. Ranjan Gopal and Rao, A.S.R., Basic and Applied Soil Mechanics, New Age
14. International Prv. Ltd.
15. Braja Das, M., Principles of Geotechnical Engineering, Thomson Asia Pvt. Ltd
16. K. Terzaghi, R. B. Peck and G. Mesri, Soil Mechanics in Engineering Practice, John Wiley &
Sons, 1996.
17. J.E. Bowles, Foundation Analysis and Design, McGraw-Hill, 2001.

Web Resources:

1. http://www.cdeep.iitb.ac.in/nptel
2. http://www.nptel.iitm.ac.in

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

HYDROLOGY AND WATER RESOURCES ENGINEERING

SUBJECT CODE: _____

B.TECH SEM-5

Type of course: Water resources engineering

Prerequisite: Knowledge of hydrological cycle and its component, ground water hydrology, Basic ideas about floods, drought, hydropower plants and reservoir

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	1	- 0	4	3.5	30	50	70		150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**INTRODUCTION:** Hydrologic cycle, Climate and water availability, Water balances, Precipitation: Forms, Classification, Variability, Measurement, Data analysis, Evaporation and its measurement, Evapotranspiration & its measurement, Penman Monteith method, Infiltration: Factors affecting infiltration, Horton's equation and Green Ampt method.	8	20
2	**HYETOGRAPH , HYDROGRAPH ANALYSIS & GROUND WATER:** Hyetograph, Runoff: drainage basin characteristics, Hydrograph concepts, assumptions and limitations of unit hydrograph, Groundwater: Occurrence, Darcy's law, Well hydraulics, Well losses, Yield, Pumping and recuperation test	10	20

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3	**CONCEPT OF RESERVOIR, DAM & HYDROELECTRIC POWER:** Types, Investigations, Site selection, Zones of storage, Safe yield, Reservoir capacity, Reservoir sedimentation and control. Introduction to Dams: Introduction and types of dams, spillways and ancillary works, Site assessment and selection of type of dam, Information about major dams and reservoirs of India Hydroelectric Power: Low, Medium and High head plants, Power house components, Hydel schemes.	12	30
4	**FLOOD MANAGEMENT & HYDROLOGIC ANALYSIS:** Indian rivers and floods, Causes of floods, Alleviation, Leeves and floodwalls, Floodways, Channel improvement, Flood damage analysis. Hydrologic Analysis: Design flood, Flood estimation, Frequency analysis, Flood routing through reservoirs and open channels.	8	20
5	**WATER RESOURCES PLANNING & DEVELOPMENT:** Levels in planning, Functional Requirements water resources projects, Steps in water resources planning, Environmental aspects in water resources planning.	4	10

Reference Books:

1. K. Subramanya, Engineering Hydrology, Tata McGraw Hill Pub. Co. New Delhi.
2. C.S.P. Ojha, R, Berndtsson and P. Bhunya, Engineering Hydrology, Oxford University Press, New Delhi.
3. R.A. Wurbs and W.P. James, Water Resources Engineering, Prentice Hall of India, New Delhi.
4. R.K. Sharma and T.K. Sharma, Hydrology and Water Resources Engineering, Dhanpat Rai Publications, New Delhi.
5. R.K. Linsley, J.B. Franzini, D.L. Freyberg and G. Tchobanoglous, Water Resources Engineering, McGraw Hill Singapore.
6. V.P. Singh, Elementary Hydrology, Prentice Hall, Englewood Cliffs, New Jersey.
7. Ven Te Chow, D.R. Maidment and L.W Mays, Applied Hydrology, McGraw Hill International Edition, New York

Course Outcome:

After learning the course the students should be able to:

1. Compute mean precipitation from a catchment
2. Compute infiltration rate and capacity
3. Calculate runoff from a catchment
4. Compute peak flood flow
5. Compute reservoir capacity using mass curve
6. Compute dependable flow using flow duration curve for the requirement of irrigation, power generation etc.
7. Basic idea about reservoir sedimentation and its control

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8. Compute the capacity of well
9. Estimation of design flood for the design of hydraulic structure
10. Measures of water conservation to battle drought

List of Tutorials:

1. To determine rate of infiltration and infiltration capacity using double ring infiltrometer.
2. Measurement of rainfall
3. Estimation of flood using unit hydrograph
4. Computation of rate of infiltration using infiltrometer
5. Computation of live and dead storage capacity of reservoir
6. Flood routing of reservoir and channel
7. Calculation of dependable flow.
8. Determination of capacity of well.
9. Calculation of power of a hydro-power plant

Major Equipment: Double ring infiltrometer, rainfall simulator, rain gauges, models of various dams

List of Open Source Software/learning website:

http://en.wikipedia.org/wiki/Hydrology.

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SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

WATER & WASTE WATER ENGINEERING

SUBJECT CODE: _____

B.TECH SEM-6

Type of course: Core Subject in Civil Engineering

Prerequisite: Study of basic Environmental Engineering

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Internal Marks		External Marks		
TH	T	P	C	TH	PR	TH	PR	
4	0	2	5	30	50	70		150

Content:

Sr. No.	Content	Total Hrs.	% Weightage
1	Water Treatment Plant: Layout of water treatment plant, Estimation of raw water discharge for treatment plant, Design period, Factors considered for selection of design period, Factors considered for site selection of Treatment Plant , Future stages of expansion	6	15
2	Collection and Conveyance of Raw Water From Source: Intakes, Design of Intakes, Types of intakes, Conveyance of water, Circumstance under which pumping is required, Classification of pumps, Factors affecting the selection of pump, Horse-Power of Pump	6	10
3	Water Treatment Processes And Treatment Units: Objectives of water treatment processes, Aeration, Plain sedimentation, Sedimentation with coagulation, Types of coagulants, Optimum dose of coagulants, Design of flocculation unit, Theory of filtration, Types of filters and their comparison, Construction of rapid sand filter, washing of filter, Methods of disinfection, Methods of removing hardness Computation of dose of chemicals for removal of hardness	8	20
4	Water Distribution system: Classification of distribution system, Layout of distribution System, Components of distribution system, Analysis of Complex Networks, Storage & Distribution Reservoirs, Types of Reservoirs, Capacity of Reservoirs.	4	10

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5	Collection, Conveyance & Estimation of Sewage Discharge: Methods of Collection, Different types of sewers, Sources & Factors affecting Sanitary Sewage, , Design of Sewers, Sewer appurtenances, Estimation of wastewater discharge in sewerage system, Estimation of storm water discharge in urban area, Separate and Combined sewerage systems, Laying and testing of sewers.	4	10
6	Unit Operations/ Processes for wastewater treatment: Layout plan and section of municipal wastewater treatment plant, Physical unit operation screening, flow equalization, mixing, flocculation, sedimentation. Chemical unit processes-chemical precipitation. Biological unit processes: Attached growth Process, Suspended growth Process, Low cost sanitation systems: Septic tank, Soak pit, Stabilization pond.	8	20
7	Design of Wastewater Treatment Units: Design of racks, screens, grit chamber, aeration units, primary & secondary clarifiers, Activated sludge Unit, Trickling filter units, Rotating biological contactors.	6	15

Reference Books:

1. Environmental engineering volume 1 and 2 by S.K.Garg, Khanna publisher
2. Environmental engineering volume 1 and 2 by B.C.Punamia, laxmi publication
3. Environmental engineering volume 1 and 2 by Dr.P.M.Modi
4. Water supply and sanitary engineering by G.S.Birdie and J.S.Birdie
5. Environmental pollution engineering by C.S. Rao wiley eastern
6. Water supply and wastewater engineering by B.S.N Raju, Tata McGraw hill, New Delhi
7. H.S. Peavy, D.R.Row & G.Tchobanoglous, environmental engineering,Mc Graw Hill Intranational Edition
8. Viesman, Hammer and Chadik, water supply and pollution control, PHI Publication.
9. M.L.Devis and D.A.Cornwell,Introdution to environmental engineering:-2nd edition-1997,Mc Graw Hill Intranational Edition
10. Metcalf and eddy,(revised by G.Tchobanoglous) Wastewater Engineering:Treatment,disposal reuse,Tata-Mc Graw Hill,New Delhi
11. Waste water treatment plants, Planning Design and Operation, Syed Qasim, CRC Press.
12. Water Works Engineering: Planning, Design and Operation, Syed R. Qasim, Edward M. Motley, Guang Zhu, CRC Press

Course Outcome:

After learning the course the students should be able to:

1. Design the water supply and wastewater treatment systems.
2. Determine the treatment efficiency of treatment units

List of Experiments:

1. Introduction to standards, collection and preservation of samples, sampling techniques and laboratory equipment
2. Determination of turbidity and jar test
3. Determination of DO and BOD

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4. Determination of COD
5. Treatability study of domestic wasteWater
6. Determination of dose of chemicals for removal of hardness of given water sample

Design based Problems (DP)/Open Ended Problem:

1. Design and preparation of layout plan and section of water treatment plant for a given town with water level shown in each unit in section. The student shall compute water levels in each unit, prepare design report and drawing.
2. Design and preparation of layout plan and section of wastewater treatment plant for a given town with wastewater levels shown in different units in sections the student shall compute wastewater levels in different units and prepare design report and drawing
3. Analyze the pipe network by Hardy cross and Newton's method and compare both methods
4. Design of sewerage system for proposed extension area of a town.
5. Measurement of efficiency of trickling filters, ASP etc by field observation in existing wastewater treatment plant.
6. In campus constructions of model treatment plant for water with guidance from teacher
7. In campus construction of model treatment plant for wastewater with guidance for teacher.

Major Equipment:

1. BOD incubator
2. COD Apparatus
3. Jar test Apparatus
4. Auto zero set Burette
5. Digital DO meter
6. Top Loading Electronic balance
7. Aerator

List of Open Source Software/learning website:

Epanet, relevant websites of IIT's

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

DESIGN OF REINFORCED CONCRETE STRUCTURE

CODE: _____

B.TECH. SEM - 6

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	1	-	5	4.5	30	50	70		150

Objectives: -

- To provide a coherent development to the students for the courses in sector of Reinforced Concrete Designing.
- To present the foundations of many Special engineering concepts related designing of structures.
- To give an experience in the implementation of designing concepts which are applied in field of structural engineering.
- To involve the application of scientific and technological principles of design of buildings according to limit state method of design.

Prerequisites: -

Mechanics of Solids, Structural analysis I & II, Concrete technology, Elementary Structural Design.

Course outline:-

Sr. No.	Course Contents	Number of Hours
UNIT-1	Wind Load Analysis	17
UNIT-2	Design RC Water Tanks	13
UNIT- 3	Design Retaining Wall	11
UNIT-4	Earthquake Resistant Design of building	11

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Learning Outcomes: -

After learning the course the students shall be able to

- Design and draw reinforced concrete Cantilever and Counterfort Retaining Walls
- Design and draw flat slab as per code provisions
- Design and draw reinforced concrete and steel water tanks
- Apply the concept of earthquake resistant design in the building.
- Assess loads, prepare layout, analyse, design and detail of various structural elements for RC framed structure up to G+3.
- Identify the typical failure modes of RC building, retaining walls, water tanks, flat slabs & prestressed concrete sections.

Content:

Sr. No.	Topics	Teaching Hrs.
UNIT-1 Wind Load Analysis	Loading standards as per I.S, distribution & flow of loads, lateral load due to wind as per IS: 875(Part – III), load combinations, guide lines for preparation of structural layout for building. Analysis, design & detailing of G + 3 RC framed building for residential /commercial purpose including ductile detailing.	17
UNIT-2 Design RC Water Tanks	Classification of water tank and method of analysis, Design & detailing of Underground Rectangular and Circular Water Tank Design & Detailing of Elevated circular & rectangular RC water tanks. Design & Detailing Intz Tank.	13
UNIT-3 Design Retaining Wall	Types, behavior and application of retaining wall, stability criteria, design & detailing of cantilever & counterfort type retaining wall for various ground conditions. Reinforced concrete Cantilever and Counter fort Retaining Walls–Horizontal Backfill with Surcharge–Design of Shear Key-Design and Drawing.	11
UNIT-4 Earthquake Resistant Design of building	Philosophy of earthquake resistant design, earthquake proof v/s earthquake resistant design, four virtues of earthquake resistant structures (strength, stiffness, ductility and configuration), seismic structural configuration, Introduction to IS: 1893 (Part I), IS: 875 (Part V). Seismic load: Seismic Coefficient Method – base shear and its distribution along height. Introduction to **Response** spectrum, IS code provisions.	11

Teaching & Learning Methodology: - Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

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Books Recommended:

1. Shah and Kurvey: Limit State theory & Design of Reinforced Concrete
2. Dr. B.C.Punamia, A.K. Jain; RCC Designs; Laxmi Publication
3. S.N.Sinha ; Reinforced Concrete Design, Tata McGrawhill
4. A.K.Jain; Design of Concrete Structures, Nemchand Publication
5. IS: 456-2000 Indian Standard code of practice for plain and reinforced concrete, Bureau of Indian Standards, New Delhi.
6. IS: 3370-Indian Standard code of practice for concrete structures for storage of liquids, Bureau of Indian Standards, New Delhi
7. IS 875 Part 3 (2003) Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Code of Practice-Wind Load, Bureau of Indian Standards, New Delhi.

E-Resources:

1. http://nptel.ac.in
2. elearning.vtu.ac.in
3. www.gsdma.org
4. www.nicee.org

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

RAILWAY, BRIDGE AND TUNNEL ENGINEERING

CODE: _____

B.TECH. SEM - 6

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	1	-	4	3.5	30	50	70		150

Objectives: -

- Railway, Bridge and Tunnel engineering are the three important aspects of civil engineering.
- Civil engineer has to play a vital role in the design and construction of railway track and other associated structures for safe and efficient movement of the trains.
- All the three aspects have been dealt with extreme care, especially the tunnel engineering on which limited reference is available

Prerequisites: - Introduction, Information about Indian railways, Components of railway, Primary knowledge of railway track, track stresses, designing, Components of bridge, classification and construction methods of bridge design, classification of tunnels, alignment of tunnel.

Course outline:-

Sr. No.	Course Contents	Number of Hours
	MODULE-I RAILWAY ENGINEERING	
1	Introduction	02
2	Components of Railway	03
3	Surveys and Alignment of Railway Lines	02
4	Track Fittings	02
5	Geometric Design of Track	03
6	Resistance To Traction	01
7	Points and Crossings	01
8	Railway Stations And Yards	02
9	Signalling And Interlocking	01

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	MODULE-II BRIDGE ENGINEERING	
10	Introduction	**05**
11	Sub-Structures	**02**
12	Construction And Erection Methods Of Bridge Super-Structure	**04**
13	Maintenance Of The Bridges	**02**
	MODULE-III TUNNEL ENGINEERING	
14	General	**02**
15	Tunnelling In Hard Rock	**02**
16	Tunnelling In Soft Ground	**02**
17	Tunnel Lining	**01**
18	Lighting, Ventilation, Dust Control, Drainage and Safety In Tunnels	**02**

Learning Outcomes:-

The theory should be taught and practical should be carried out in such a manner that students are able to acquire required learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes:

- Identify the components of railway tracks.
- Maintain the railway tracks.
- The students will gain an experience in the implementation of Railway, Bridge and Tunnel Engineering on engineering concepts which are applied in field of Transportation Engineering.
- Diagnose the condition of bridge.
- Maintain different types of railway bridges and their components.
- Maintain different types of tunnels.

Content:

Sr. No.	Topics	Teaching Hrs.
	MODULE-I RAILWAY ENGINEERING	
Chapter-1	**Introduction:** Brief history of railways, Importance of railways, Indian railways, Development of the Indian railway, Classification of Indian Railways, Comparison between Railway and Road Transportation.	**02**
Chapter-2	**Components of Railway:** Describing Railway component parts with sketch, requirements of an ideal permanent way, cross section of permanent way as per IRS. **1)Railway track gauge & track stresses:** Definition of gauge of track, Factors affecting the choice of a gauge, Types of gauges, Uniformity in gauges, Loading and Construction gauges, Track capacity, Stresses in Rails/Sleepers/Ballast, Coning Wheels. **2)Rails:** Functions of rails, Requirements of an ideal rail, Types of rails, Failure of rails, Welding of rails, Wear of rails. **3)Sleeper:** Functions of sleepers, Types of sleepers, Requirements of an ideal material for sleeper, Materials for cross-sleepers, Sleeper density. **4)Ballast:** Functions of ballast, Requirements of an ideal material for ballast, Materials used as ballast, Size and quantity of ballast	

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Chapter-3	**Surveys and Alignment of Railway Lines:** Factors governing rail alignment, selection of good alignment, Location survey for track alignment, Mountain railway.	**03**
Chapter-4	**Track Fittings:** Types of rail joints, Avoidance of rail joints, Purpose and Types of Track Fittings, Fastenings for rails, Fish-plates, Spikes, Chairs and keys, Bolts.	**02**
Chapter-5	**Geometric Design of Track:** Geometric Design of Track, It's necessity, Types of curves, Super-elevation or cant, Widening gauge on curves, Gradients, Examples.	**02**
Chapter-6	**Resistance To Traction:** Train resistances, Definition of Traction, Traction resistance.	**03**
Chapter-7	**Points and Crossings:** Purpose, Types of crossings, Turnout, Switches, Shapes of switches, Double Junctions, slips.	**01**
Chapter-8	**Railway Stations And Yards:** Purposes of a railway station, Selection of site for a railway station, Facilities required at railway stations, Classification of stations, Operational classification, Definition of a yard, Types of yards,	**01**
Chapter-9	**Signalling And Interlocking:** Objects of signaling, Classification of signals, Classification according to function, Interlocking, Essential principles of interlocking, Methods of interlocking, Track Circuiting.	**02**
MODULE-II BRIDGE ENGINEERING		
Chapter-1	**Introduction:** General, Importance of bridges, Identification of bridges, Requirements of an Ideal Bridge, Selection of bridge site, Preliminary data to be collected for bridge project, Preliminary and final project drawings, Choice of bridge type, Components of a bridge, Number of spans of a bridge, Afflux, Clearance and freeboard, Maximum flood discharge or High flood level (H.F.L.), Length of a bridge.	**05**
Chapter-2	**Sub-Structures:** Components of bridge, Classification of bridges, Classification of bridges according to flexibility of superstructure, Floating bridges, Materials for sub-structures.	**02**
Chapter-3	**Construction And Erection Methods Of Bridge Super-Structure:** General, Erection of steel girders, Erection of steel truss bridges, Erection of suspension bridges, Construction of pre-stressed concrete super-structure, Erection of R.C.C. and pre-stressed girder bridges, Formwork for arch bridges, Forces acting on different parts of Bridges.	**04**
Chapter-4	**Maintenance Of The Bridges:** Deterioration of bridges, Bridge Failures, Defects of bridges and their rectification, Inspection of bridges, Maintenance of the bridges.	**02**
MODULE-III TUNNEL ENGINEERING		

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Chapter-1	**General:** Advantages and disadvantages of tunneling, Classification of tunnels, Alignment of a tunnel, Shape of tunnels, Size of tunnels, Investigations for tunnel site, Problems in tunneling, Advantages of shafts, Size of shafts, Classification of shafts, Construction of shafts in rock.	02
Chapter-2	**Tunnelling In Hard Rock:** General, Sequence of operations for tunnelling in rock, Faces of attack for tunnelling in rock, Methods of tunnelling in rock.	02
Chapter-3	**Tunnelling In Soft Ground:** Choice of method, Methods of tunnelling in soft ground.	02
Chapter-4	**Tunnel Lining:** Necessity of lining, Objects of lining, Materials for lining, Sequence of lining a tunnel.	01
Chapter-5	**Lighting, Ventilation, Dust Control, Drainage and Safety In Tunnels:** Tunnel lighting, Types of tunnel lights, Spacing of lights, Ventilation in tunnel, Objects of tunnel ventilation, Requirements of tunnel ventilation, Methods of ventilation, Drainage of Tunnels, Drainage Systems, Safety precautions in tunnelling, Health protection.	02

Teaching & Learning Methodology: - Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

Books Recommended:

1. Vaswani, NK, "Railway Engineering", Publishing House, Roorkee
2. Rangwala, SC, "Railway Engineering", Anand, Charotar Book Stall
3. Deshpande, R, "A Text Book of Railway Engineering", Poonam United BooK Corporation
4. S.P.Bindra,Principles and Practice of Bridge Engineering, Dhanpat Rai &Sons, New Delh
5. Algia, JS "Bridge Engineering", Anand, Charotar Book Stall
6. Victor Johnson, "Essentials of Bridge Engineering" Oxford and IBH, Delhi
7. Rangwala S.C., "Bridge Engineering", Anand, Charotar Book Stall
8. IRC Bridge Codes
9. Subhash C Saxena, "Tunnel Engineering", Dhanpat Rai and Sons, Delhi

E-Resources:

1. http://edudel.nic.in
2. https://nptel.ac.in

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

ADVANCED CONSTRUCTION AND EQUIPMENTS

CODE: _____

B.TECH.SEM-6

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	1	0	4	3.5	30		70		150

Objectives: -

Prerequisites: - Study of building construction.

Course outline: -

Sr. No.	Course Contents	Number of Hours
Unit-1	Pile Foundation and cassions	08
Unit-2	Daiphragm wall , Coffer dams & Control of Ground water in excavations	05
Unit-3	Formwork, Tall Structures, Demolition of Structures.	08
Unit-4	Construction Equipments	05
Unit-5	Excavating Equipments	08
Unit-6	Hauling & Conveying Equipments	08

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Course outcome: -

On completion of this module, the learner will be able to:

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1. Supervise the heavy construction sites.
2. Understand the working principle and use of various equipments
3. Select appropriate construction equipments for desired construction works.
4. Execute the operations of Demolition of structures with safety.
5. Erect the false work for Bridges and form work for Heavy structures

Content:

Sr.No.	Topics	Teaching Hrs.
Unit-1	**Pile Foundations:** Introduction, uses, selection of pile, types of piles, pile cap and pile shoe, pile driving methods, micro piling, causes of failures of piles, Heaving of piles **Caissons:** Definition, uses, construction material, types of caissons, loads on caisson, design features of caissons, floating of caissons, cutting edges, sinking of caisson, tilting of caisson, shifting of caisson, caisson diseases.	08
Unit-2	**Diaphragm wall construction** Introduction, uses, site selection criteria. **Coffer Dams:** Definition, uses, selection of coffer dams, types of coffer dams, design features of coffer dams, leakage prevention, economic height. **Control of Ground water in Excavations:** Methods-pumping, well points, bore wells, electro-osmosis, injections with cement, clays and chemical, freezing process, vibro- flotation.	05
Unit-3	**Form work** Form work for R.C.C. Wall, slab, beam and column, centering for arches of large spans and dams, design features for temporary works, slip formwork, False work for Bridges **Construction of tall structures.** Materials of tall structures. Structural system for tall structures. Methods of construction of tall structures. **Demolition of Structure:** Demolition, taking down, dismantling, methods, safety.	08
Unit-4	**Construction Equipment :** 1. Mechanization in Construction: Importance of construction equipments their classification, selection and contribution rate of production (Output), Owning and operating cost. 2. Engineering fundamentals : Related to performance of IC engines, rimpull, drawbar pull, Coefficient of traction, Gradability.	05
Unit-5	**Excavating equipments :** Selection, basic parts, operation, factors affecting output Tractors and related equipment: Bulldozers, Rippers, Scrapers Excavating Equipment: Power shovels, Draglines, Hoes, Clam shells and trenching machines.	08
Unit-6	**Hauling and conveying equipments :** • Belt conveyor system : Terminology, Classification, Components, Power requirement estimation and design. • Hauling and lifting equipment: Trucks, wagons, cranes etc. • Pile boring / driving equipment • Concrete Batching plant • Tunnel Boring machines • Crushers • Air compressors • Drilling and blasting equipments	08

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Teaching & Learning Methodology: - Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

List of Tutorials:

There shall be at least one construction site visit and students shall prepare visit report.

1. The student shall visit the construction failure site and investigate the reasons of failure under supervision of faculty member.

2. Student shall actually observe the working of construction equipment and work out the out put of equipment from site observations the and compare it with that claimed by manufacturer.

3. The student shall work out the number of trucks required for hauling earth continuously with zero waiting period at sites requiring heavy excavation and hauling of earth

4. Workout owning and operating cost from field observations.

5. Contact the construction equipment manufacturer visit the factory and suggest their views in a visit report.

6. Work out how much money is saved daily by employing machines at construction sites, instead of labour force.

Major Equipment: Working models of various construction equipments

Books Recommended:

1. Building Construction by B.C.Punamia

2. Building Construction by S.C.Rangwala

3. Building Construction by Gurucharan Singh

4. Heavy Construction by Vazirani & Chandola

5. Construction, Planning, Equipment and Methods by R.L.Peurifoy

6. Building Construction By Dr. Jha & S.K. Sinha

7. Hand book of Heavy construction: O'Brien, Havers & Stubb

8. Construction Engineering and Management By S.Seetharaman

9. Construction Equipment and Its Management By S C Sharma

10. Construction Equipment By Jagdish Lal

11. Construction equipment and its planning and application By Mahesh Verma Metropolitan Book

Web Resources:

http://www.equipmentworld.com/

www.constructionequipment.com

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

PROFESSIONAL PRACTICE AND VALUATION

CODE: _____

B.TECH SEM 6

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	1	-	5	4.5	30	50	70		150

Objectives: -

A Civil Engineer is supposed to find out following things.
1) Estimated cost of a proposed structure.
2) The value of the existing structure.
3) Rates of items of civil engineering works.

Course outline: -

Sr.No.	Course Contents	Number of Hours
1	Computation of areas and volumes	04
2	Estimates	10
3	Specifications	04
4	Rate Analysis	06
5	Contract	04
6	Tender and Tender notice	04
7	Valuation	10

Learning Outcomes:-

After learning the course the students should be able to:
(1) Work out (i) the estimated cost of any proposed civil engineering structure and (ii) The value of any old structure
(2) Apply the software for working out quantities of items of civil works.

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Content:

Sr. No.	Topics	Teaching Hrs.
1	**Computation of areas and volumes:** (i) Cylinder- Area of curved surface and volume (ii) Cone- Volume and area of curved surface (iii) Frustum of cone- Volume and curved surface area (iv) Frustum of pyramid- Volume and surface area of all sides. (v) Area of sector and segment of a circle (vi) Area and volume of sphere and segment of sphere (vii) Ellipse- Area of ellipse and Units of measurements	04
2	**Estimates:** Definition, Units of measurements, types of estimates, Different Methods to find the quantities of civil works. Estimated cost And its Importance. Provisions of IS-1200, for working out quantities and Deductions in civil works. Entering the measurements in quantity sheet and calculation of quantities of various items of civil works for residential , commercial and industrial buildings, Market rates of material and labour, Introduction to schedule of rates, Entering Quantities and rates in abstract sheet, calculation of estimated cost.	10
3	**Specifications:** Definition, importance of specification , Types of specification, Care to be taken while drafting specifications, Drafting general specifications, and detailed specifications for various civil work items.	04
4	**Rate Analysis:** Definition of rate analysis, Definition of task, Determination of man power and material requirement for a given quantity of items of civil works, study of present wages of labour and prices of material in the Market. Study of market rents of different construction equipments, Determination of rate of item of civil work. Working out rates of various items of civil works like 10m2 plaster,10m3 1:2:4 plain and reinforced concrete, 10m3 brick work etc	06
5	**Contract:** Definition, legal requirements of a valid contract ,types of contracts, conditions of contract, sub contracts and contractual disputes, Arbitration.	04
6	**Tender and Tender notice:** Bidding process, Prequalification process, tender notice and its essential features, drafting tender notice, Bid submission, Analysis of tenders, Basis for evaluation and acceptance, letter of intent, work order, agreement.	04
7	**Valuation:** Definitions of value, price and cost, depreciation, sinking fund , different type of values and their significance, factor affecting value, rent and standard rent, Years purchase , valuation tables, Easement, types of easements, significance of easement in valuation, Methods of valuation of buildings and land, Estimation of values of different types of buildings and lands.	10

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Teaching & Learning Methodology: - Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

Books Recommended:

(1) B. N. Dutta, Estimation and Costing In Civil Engineering, Ubs Publishers Distributors, Ltd.

(2) S. C. Rangwala, Estimating and Costing, Charotar Publishing House.

(3) G. S. Birdi, Textbook of Estimating & Costing, Dhanpat Rai and Sons, Delhi.

(4) M. Chakraborti, Estimating, Costing, Specification and Valuation.

(5) P.W.D. Handbook and SOR, IS Code – 1200.

(6) A. S. Kotadia, Professional Practice and Valuation, Mahajan Publications.

(7) S. C. Rangwala, Valuation of Real Properties, Charotar Publication.

E-Resources:

http://nptel.iitm.ac.in

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

DESIGN OF REINFORCED CONCRETE STRUCTURE

CODE: 23030602

B.TECH. SEM - 6

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	1	-	5	5	30	50	70	-	150

Objectives: -

- To provide a coherent development to the students for the courses in sector of Reinforced Concrete Designing.
- To present the foundations of many Special engineering concepts related designing of structures.
- To give an experience in the implementation of designing concepts which are applied in field of structural engineering.
- To involve the application of scientific and technological principles of design of buildings according to limit state method of design.

Prerequisites: -

Mechanics of Solids, Structural analysis I & II, Concrete technology, Elementary Structural Design.

Course outline:-

Sr. No.	Course Contents	Number of Hours
UNIT-1	Wind Load Analysis	15
UNIT-2	Limit state design of RC elements	08
UNIT-3	Design of Foundations	06
UNIT-4	Design RC Water Tanks	10
UNIT-5	Design Retaining Wall	09
UNIT-6	Earthquake Resistant Design of building	09

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Prof. Mami Prajapati

Dr. M.N. PATEL

Learning Outcomes: -

After learning the course the students shall be able to

- Design and draw reinforced concrete Cantilever and Counterfort Retaining Walls
- Design and draw flat slab as per code provisions
- Design and draw reinforced concrete and steel water tanks
- Apply the concept of earthquake resistant design in the building.
- Assess loads, prepare layout, analyse, design and detail of various structural elements for RC framed structure up to G+3.
- Identify the typical failure modes of RC building, retaining walls, water tanks, flat slabs & prestressed concrete sections.

Content:

Sr. No.	Topics	Teaching Hrs.
UNIT-1 Wind Load Analysis	Loading standards as per I.S, distribution & flow of loads, lateral load due to wind as per IS: 875(Part – III), load combinations, guide lines for preparation of structural layout for building. Analysis, design & detailing of G + 3 RC framed building for residential /commercial purpose including ductile detailing.	15
UNIT-2 Limit state design of RC elements	Philosophy of Limit state design: Limit state of collapse & serviceability, partial safety factors for material & loading. Limit State of Flexure: Stress-strain characteristics of concrete & reinforcing steel, Type of section-under reinforced, over reinforced & balance section, Neutral Axis depth, Moment of Resistance for singly reinforced, doubly reinforced and flanged sections.	08
UNIT-3 Design of Foundations	Design of isolated footing under axial load and uni-axial bending, combined footing	06
UNIT-4 Design RC Water Tanks	Classification of water tank and method of analysis, Design & detailing of Underground Rectangular and Circular Water Tank Design & Detailing of Elevated circular & rectangular RC water tanks. Design & Detailing Intz Tank.	10
UNIT-5 Design Retaining Wall	Types, behavior and application of retaining wall, stability criteria, design & detailing of cantilever & counterfort type retaining wall for various ground conditions. Reinforced concrete Cantilever and Counter fort Retaining Walls–Horizontal Backfill with Surcharge–Design of Shear Key-Design and Drawing.	09
UNIT-6 Earthquake Resistant Design of building	Philosophy of earthquake resistant design, earthquake proof v/s earthquake resistant design, four virtues of earthquake resistant structures (strength, stiffness, ductility and configuration), seismic structural configuration, Introduction to IS: 1893 (Part I), IS: 875 (Part V). Seismic load: Seismic Coefficient Method – base shear and its distribution along height. Introduction to **Response** spectrum, IS code provisions.	09

Prof. Mami Bajapati

DR. M.N. PATEL

Teaching & Learning Methodology: - Chalk and Talk method mostly preferable and Power point presentation is also preferable for some needful topics.

Books Recommended:

1. Shah and Kurvey; Limit State theory & Design of Reinforced Concrete
2. Dr. B.C.Punamia, A.K. Jain; RCC Designs; Laxmi Publication
3. S.N.Sinha ; Reinforced Concrete Design, Tata McGrawhill
4. A.K.Jain; Design of Concrete Structures, Nemchand Publication
5. IS: 456-2000 Indian Standard code of practice for plain and reinforced concrete, Bureau of Indian Standards, New Delhi.
6. IS: 3370-Indian Standard code of practice for concrete structures for storage of liquids, Bureau of Indian Standards, New Delhi
7. IS 875 Part 3 (2003) Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Code of Practice-Wind Load, Bureau of Indian Standards, New Delhi.

E-Resources:

1. http://nptel.ac.in
2. elearning.vtu.ac.in
3. www.gsdma.org
4. www.nicee.org

Prof. Mam Prajapati

Dr. M.N. PATEL

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING

DEPARTMENT OF AUTOMOBILE ENGG.

VEHICLE MAINTANCE & GARAGE PRACTICE

CODE:

B.E. 6TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	00	150

Objective: To understand maintenance techniques and garage practices. Students will also be able to learn about different documents used and records required in modern service station.

Prerequisites: .Automobile system

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Vehicular Maintenance Practices:** Requirements and importance of service & maintenance, Preventive, Predictive & Breakdown maintenance, daily, weekly and monthly maintenance schedule, Periodic maintenance scheduled chart, Study of workflow in service station.	04
2	**Tools & Instruments:** Micrometer, Vernier calipers, Filler gauge, bore gauge, surface roughness meter, tachometer, piston ring compressor, Automobile service tools Methods for measurement of specific fuel consumption and air consumption, OBD, Exhaust gas analyzer, injector cleaner, spark plug cleaner	06
3	**Service Station Operations:** Types, functions, operations and activities of service stations. Layouts of modern service station/workshop. Criteria and requirements of service station and its layout.	04
4	**Engine Maintenance – Repairs & Overhauling:** Cylinder Block:cylinder liner inspection-bore, surface finish, cracks etc., cylinder bore honing, cylinder liners fitting Cylinder Head: Compression seat lapping, valve seat grinding and lapping, Valve turning and lapping, color matching test, Valve guide, Injector/sparkplug sleeve inspection. Connecting rod alignment, bearing inspection and measurement, Main bearing inspection and measurement, Mandrill pass test of main bearing, end play and radial	12

	play of crankshaft, crankshaft overhauling Adjustment of valve timing and fuel injection pump timing, firing order, tappet clearance adjustment/setting procedure. Crankcase examination.	
5	**Maintenance of Fuel Systems, Cooling Systems & Lubrication System Petrol Engine** - Carburetor- tuning and setting of MPFI engines, Diesel engine - Fuel injection pumps and fuel injector's calibration, Cleaning of water cooling system, water pump & radiator maintenance, maintenance of lubricating system	04
6	**Chassis Maintenance** Repairing of gear box and shifting mechanism, Final drive and differential maintenance, differential back lash adjustment,Adjustment of clutch pedal free play, repair/replacement of clutch parts, Repair & maintenance of Propeller shaft "U" joints and Centre bearing Hydraulic brakes circuit- brake adjustment, bleeding of brakes, Study of Air Brakes circuit & system components, Chassis greasing, wheel bearing greasing, Bearing Preload adjustment, Suspension system – lubrication, Steering system linkages, Wheel alignment: toe in, toe out, caster and camber, Wheels and tyre maintenance, re-treading of tires, wheel balancing,	08
7	**Electrical System Maintenance - Servicing & Repairs** Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems. Fault diagnosis and maintenance of modern	04
8	**Miscellaneous Systems – Servicing & Repair** Air Conditioning Systems, Body repairing and denting.	02
9	**Workshop management practices :** Study of Workshop documents & records like job cards, parts catalogue, parts price list, vehicle history sheet, warranty card, bill & billing procedure of vehicle, logbook of vehicle, customer satisfaction sheet, service book, etc. Activities and responsibilities of workshop management. Customer complaint Handling & consumer cases in case of any dispute	06

Learning Outcomes: - After learning the course the students should be able to

1. Understanding of maintenance types/techniques.
2. Learning of different garage equipments and practices.
3. Learning of workshop documents and records.

Teaching & Learning Methodology:-

It is theoretical subject with application of mathematics. So following teaching methodology should be appropriate.

1. Explaining terminology, the importance of units and dimensions, Thermodynamic concepts, basic Thermodynamics principles, mathematical representations of the basic principles, calculation techniques.
2. Classroom Communication
3. Presentation of various charts and drawings related to thermodynamics processes.
4. Interactive Learning Methods

Books Recommended:

1. Vehicle Maintenance & Garage Practices by Doshi, Panchal & Maniar, PHI India

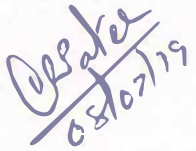
Updated 8/07/19

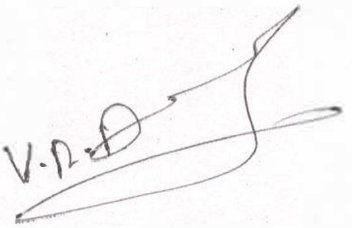
2. Automotive mechanics by Crouse, TMH
3. Automobile Systems, Anil Chikara
4. Advanced Engine Performance Diagnosis, James D Halderman, PHI, 1998
5. Automechanics, Joseph Heitner, East West Press
6. Advance Vehicle Technology, Heinz Heisler, Butterworth Heinemann Publication
7. Advance Automotive Fault Diagnosis, Tom Denton, Butterworth Heinemann Publication

List of Open Source Software/learning website: www.youtube.com

Practical List:-

1. Study of modern workshop layout.
2. Study of different types of job cards & maintenance schedule chart.
3. Study of measuring, gauging & service equipments.
4. Demonstration on tire inflator and hydraulic hoist.
5. Demonstration on tire changer and car washer unit.
6. Performance on wheel balancer.
7. Performance on wheel aligner.
8. Cleaning and testing of petrol injector.
9. Cleaning and testing of different types of nozzles.
10. Bleeding of hydraulic brakes.
11. Overhauling of any component or system of a vehicle.
12. Study of different workshop documents & records





SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING

DEPARTMENT OF AUTOMOBILE ENGG.

SPECIAL PURPOSE VEHICLE

CODE:

B.E. 6TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	50	70	00	150

Objective: - To get knowledge of various special purpose vehicles existing systems and their applications in the present context.

Prerequisites: - Automobile systems.

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Introduction:** Classification of special purpose vehicles, wheel types & truck type & their applications.	4
2	**Earthmoving Equipment:** Construction and working features of Digging machines: Excavators and Loaders, Surface Digging Machines: Dozer, Grader, Scraper	6
3	**Road Making Equipment:** Construction and working features of Pavers, Compactors, Road roller	6
4	**Hauling Equipment:** Construction and working features of Truck/Dump truck, Tipper or tractor trailer	6
5	**Lifting Machinery:** Construction and working features of Truck/Tractor mounted crane, All terrain/Rough terrain crane, Tower cranes, Portable cranes, Fork lift	8
6	**Farm Equipment:** Classification of tractors, layout, load distribution, engine, transmission & drive line, steering, braking system, wheels & tyres, hydraulic system, auxiliary systems, PTO shaft, Different types of implements, accessories and attachments.	10
7	**Special Application Vehicles:** Oil tanker, Ambulance, Fire fighter/extinguishing vehicle, Tracked vehicles, Articulated vehicles, Multi-axle vehicles, Military and combat vehicles	5

08/07/19

Learning Outcomes: -After learning the course the students should be able to

1. Students will be able to understand special type of vehicles based on the need and purpose.
2. Students will be able describe the working principles.
3. Students will be able to understand design considerations and features of special purpose vehicles.

Teaching & Learning Methodology:-

1. Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute.

Books Recommended:

Y. Pokras and M. Tushnyakov, "Construction Equipment Operation & Maintenance", MIR, Moscow.

2. A. Astskhov, "Truck Cranes", MIR, Moscow.

3. E.G. Poninson, "Motor Graders", MIR, Moscow.

4. Hand book of Earth Moving Machinery - Central Water & Power Commission (Govt. of India)

5. N. Rudenko, "Material Handling Equipment", M.R. Publishers.

6. Sheldon, R.Shacket, "Electric Vehicles", Domus Books, New York

7. David A. Day, Neal B. H. Benjamin, "Construction Equipment Guide", Wiley;

8. C.P. Nakra, "Farm Machines and Equipment", DhanpatRai Publications, New Delhi

List of Open Source Software/learning website: http://nptel.iitm.ac.in/courses.php

Tutorial List:-

1. Study of tipping mechanism of a dumper.
2. Study of forklift truck.
3. Study of operation of a truck crane.
4. Study of technical & operational features of a tractor.
5. Study of technical & operational features of a power scraper.
6. Study of technical & operational features of a power hoe and shovel.
7. Study of an extinguishing vehicle..

08/07/19

V.R.D

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING

DEPARTMENT OF AUTOMOBILE ENGG.

HYBRID VEHICLE TECHNOLOGY

CODE:_____

B.E. 6TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	0	2	5	4	30	50	70	50	150

Objective: - This course introduces the fundamental concepts, principles, analysis and design of hybrid and electric vehicles and it goes deeper into the various aspects of hybrid and electric drive train such as their configuration, types of electric machines that can be used, energy storage devices, etc. Each topic will be developed in logical progression with up-to-date information.

Prerequisites: -Basics of Automobile and Mechanical.

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Introduction to Hybrid Vehicle system:** History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.	06
2	**Conventional Vehicles:** Basics of vehicle performance, vehicle power source characterization, transmission characteristics, and mathematical models to describe vehicle performance.	05
3	**Hybrid Electric and Electric Drive Train:** Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis. Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis	10
4	**Electric Propulsion Unit:** Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency	12

08/07/17

5	**Energy Storage and Sizing the Drive System:** Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices. Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology,	12

Learning Outcomes: -

After learning the course the students should be able to understand

1. Types of hybrid vehicles and their social importance.
2. Comparision of Conventional and Hybrid Vehicle.
3. Concepts of Electrical Drive train and their Topology.
4. The Usage of circuit and controllers.
5. Types of batteries and Energy Storage.

After studying this subject students will able to design and develop hybrid electric vehicle.

Teaching & Learning Methodology:-

1. Explaining the basic fundamentals of automobile and hybrid vehicle technology.
2. Classroom Communication.
3. Interactive Learning Methods

Practical List:

1. Study of Designing in Hybrid Vehicle.
2. Study of Framing and Structures.
3. Study of Scalability in various products of Hybrid Vehicle.
4. Study of Product Development.
5. Design of Battery Electric Vehicle.

Books Recommended:

1. Iqbal Hussein, "Electric & Hybrid Vehicles: Design Fundamentals", CRC Press, 2003.
2. MehrdadEhsani, YimiGao, Sebastian E. Gay, Ali Emadi, "Modern Electric, Hybrid Electric & Fuel Cell Vehicles: Fundamentals, Theory & Design", CRC Press, 2004.
3. James Larminie, John Lowry, "Electric Vehicle Technology Explained", Wiley, 2003.

List of Open Source Software/learning website: https://nptel.ac.in/downloads/108103009/

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF AUTOMOBILE ENGINEERING
MODERN QUALITY TECHNIQUES
CODE:
B.E. 6TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	00	150

Objective: - To facilitate the understanding of Quality Management principles and process..
Prerequisites: --.

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**INTRODUCTION:** Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.	9
2	**TQM PRINCIPLES** Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.	9
3	**TQM TOOLS AND TECHNIQUES I** The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.	9

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4	**TQM TOOLS AND TECHNIQUES II** Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.	9
5	**QUALITY MANAGEMENT SYSTEM:** Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation— Documentation—Internal Audits—Registration--ENVIRONMENTAL MANAGEMENT SYSTEM: Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001— Benefits of EMS.	9

Learning Outcomes: -

- To learn the basic concepts of quality and quality from organizational point of view.
- To learn the concept of total quality management from western and Japanese approach.
- To learn the internal politics, quality culture, education and training of the organization.
- To be aware of international/national Quality awards.

Teaching & Learning Methodology:-

Following teaching methodology should be appropriate.

1. Explaining terminology, the importance of various processes and techniques
2. Classroom Communication
3. Presentation of various charts and drawings related to processes.
4. Interactive Learning Methods

Books Recommended:

1. Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, "Total Quality Management", Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.
2. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
3. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
4. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.

List of Open Source Software/learning website:

https://ocw.mit.edu/courses/sloan-school-of-management/15-760b-introduction-to-operations-management-spring-2004/index.htm

https://nptel.ac.in/courses/110104080/

Practical List:-

1. To study about ISO/TS 16949
2. To study about ISO 9001
3. To study about Toyota TQM

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF AUTOMOBILE ENGG.
AUTOMOBILE FUEL & POWER SYSTEM
CODE:
B.E. 6TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objective: -Understanding of alternate fuel and power systems for automobile applications.
Prerequisites: - Basics of Elements of Mechanical Engineering.
Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Biofuels:** Alcohol: Sources of Methanol and Ethanol, methods of its production. Properties of methanol & ethanol as engine fuels, Use of alcohols in S.I. and C.I. engines, performance of blending methanol with gasoline. Emulsification of alcohol and diesel. Dual fuel systems. Improvement/Change in emission characteristics with respect to % blending of Alcohol.	5
2	**Bio-diesels:** Base materials used for production of Bio Diesel (Karanji oil, Neem oil, Sunflower oil, Soyabeen oil, Musturd oil, Palm oil, Jatropha seeds, Algae). Process of separation of Bio Diesel. Properties Diesel blended with vegetable oil, and difference in performance of Engine.	6
3	**Biogas:** Introduction to Biogas system, Process during gas formation, Factors affecting biogas formation. Usage of Biogas in SI engine & CI engine, Produces gas for biomass gasification	5
4	**CNG:** Properties of CNG as engine fuels, fuel metering systems, combustion characteristics, effect on performance, storage, emission, cost and safety.	5
5	**Electric & Hybrid Vehicles:** Analysis of electrical drive trains, Topology of electric/hybrid systems, Sizing of components, Electric motors for automobile applications, Electric Propulsion system, Battery Storage	6
6	**Solar Powered Vehicles:** Solar cells for energy collection. Storage batteries, layout of solar powered automobiles. Advantages and limitations.	6
7	**Other Alternative Fuels:** Di-Methyl Ether (DME), Pyrolysis gas/oil, Synthetic gas/oil from plastic, rubber, coal, wood etc., Eco Friendly Plastic fuels (EPF).	6

08/07/14

8	**Fuel Cells:** Fuel cells principle, working, Thermodynamic analysis, Types, Fuel cell application in automobiles, Electric-Fuel cell hybrid configurations.	6

Learning Outcomes: -

1. Introduction to alternative fuels like biofuels – Alcohol, Biodiesel, Biogas
2. Understanding hydrogen gas as fuel of the future
3. Introduction to fuel cell technology for automobiles
4. Introduction of Electric and Hybrid vehicles

Teaching & Learning Methodology:-

1. Classroom Communication
2. Presentation of various topics like Biofuel , solar operated car, hybrid car etc.
3. Interactive Learning Methods

Books Recommended:

1. Alternate Fuels by Dr. S. Thipse, Jaico Publications.

2. Bent Sorensen (Sorensen), Hydrogen and Fuel Cells: Emerging Technologies and Applications, Elsevier Academic Press, UK

3. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003

4. "Automotive Emission Control" by Crouse, AND Anglin – McGraw Hill

5. "Alternative Fuels Guidebook" by Bechtold R.

6. SAE Paper nos. 840367, 841333, 841334

7. "The properties and performance of modern alternative fuels" – SAE Paper No. 841210.

8. Viswanathan, B and M Aulice Scibioh, Fuel Cells – Principles and Applications, Universities Press

9. Rebecca L. and Busby, Hydrogen and Fuel Cells: A Comprehensive Guide, Penn Well Corporation, Oklahoma

List of Open Source Software/learning website:

youtube channel : Techtrixinfo

Study practical list:-

1. Inspect and study different components of CNG based vehicle
2. Study of hydrogen based automobiles
3. Inspect/study Electric Hybrid Vehicles
4. Study of different topological configurations of Electric Hybrid Vehicles
5. Study of different Electric-Fuel cell hybrid configurations.
6. Study of solar powered vehicles.

05/07/19

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING

DEPARTMENT OF AUTOMOBILE ENGG.

AUTOMOBILE SYSTEM

CODE:

B.E. 5TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	00	150

Objective: - Understanding about the various parts of the automobile systems. Main aims to build higher level skill to future engineers for studying different types of transmission and suspension systems. The knowledge of this subject is essential to calculate the resistances during motion, power required for acceleration and constant velocity motions, braking force and engine characteristics

Prerequisites: - Fundamentals of I. C. Engines, Theory of Machine and Elementary of Machine Design

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Layout of Automobile :** Study various vehicle layouts as front engine and front wheel drive, front engine & rear wheel drive, rear engine & rear wheel drive, Components of transmission system, Four wheel drives, study of types of Chassis frames & body, Material, Unitized construction	5
2	**Clutch:** requirements, principle, types, components; construction and working of single plate, multiplate, centrifugal and cone clutch; wet clutch, fluid flywheel, electromagnetic and hydraulic clutches,	5
3	**Brakes:** Classification, principle, braking requirements, efficiency, stopping distance, drum brakes, disc brakes, mechanical brakes, hydraulic brakes, brake fluid, bleeding, brake lining material and its properties, pneumatic braking system, vacuum brake, exhaust brake, electrical brake, and parking brake	6
4	**Transmission system:** Function and necessity, types, construction and working of sliding mesh, constant mesh, synchromesh gearbox, selector mechanism, transfer box **Automatic transmission system:** Epicyclic gearbox, freewheel unit, Torque converter, principle, construction and working of automatic transmission, Continuously variable transmission. **Drive line and Axles** : Propellers shaft, universal joints, Types of drive as torque tube and hotch kiss drive, Final drive types, Bevel, Worm and worm	8

	wheel, Type of drive axles & differential, Fully or semi floating and three quarter floating, Dead axle	
5	**Suspension System :** Purpose, Types of suspension system, Front and rear suspension, Coil spring, Leaf spring, Torsion bars, Shock absorbers, Air and rubber suspension, Plastic suspensions, Hydro-pneumatic suspension, Independent suspension, anti-roll bar	6
6	**Steering and Front Axle** : Introduction to front axle, types, Requirements, Condition for correct steering, Steering system and linkages, Steering gears, steering ratio, Steering geometry, Ackermann linkages, Wheel alignment, Toe-in, Toeout, Caster, Camber, Under steer and over steer conditions, Power steering, Steering wheel shimmy	6
7	**Wheels and Tyres** : Types of wheel rims, Tread patterns, Types of tyres, Cross ply, Radial & tubeless tyres, Specifications of tyres, tyre properties, tyre materials and tyre designation	8

Learning Outcomes: -After learning the course the students should be able to:

1. Understand the various vehicle classification and its layouts.
2. Understand the different types of systems. of clutches and brakes
3. Understand the functions of different types suspension.
4. Understand the transmission systems.
5. Understand the steering requirements and types of front axle.
6. Understand the performance of vehicle.
7. Understand the types of wheel rims and tyres with their specifications

Teaching & Learning Methodology:-

It is theoretical subject with application Explaining terminology, the importance of units and dimensions,

1. Classroom Communication.
2. Presentation of various of different system of automobile.
3. Interactive Learning Methods

Books Recommended:

1. Automotive mechanics by W. Crouse, - TMH.
2. Automobile Engineering Vol-I & II Dr. K.M. Gupta
3. Automobile Engineering, Vol-I Dr. Kripal Singh.
4. Motor vehicle Newton and steed
5. Automobile engineering GBS Narang.
6. Vehicle Technology Heinz Heizler.
7. Automobile system W. Judge

List of Open Source Software/learning website:

YouTube channel: Techtrixinfo.

Study practical List:-

1. To study about vehicle layouts.
2. To study about different types of clutch.
3. To study about the performance of vehicle.
4. To study about rear axle, final drive and differential.
5. To study about Automatic Transmission system.

6. To study about different types of tyres and wheels.
7. To study of different types of automobile brakes.
8. To study of steering systems.
9. To study about different types of suspension system.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING

DEPARTMENT OF AUTOMOBILE ENGINEERING

AUTOMOBILE ENGINES

CODE: _____

B.E. 5TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	00	150

Objective: - On completion of this course, the students are expected to understand the concept of working principles of SI and CI Engines, lubrication, cooling system, super charging and scavenging systems.

Prerequisites: - Basics of Elements of Mechanical Engineering.

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**INTRODUCTION:** Four stroke SI and CI engines - Working principle and terminology - function, materials, constructional details of engine components - Valve and port timing diagram, - Firing order and its significance - relative merits and demerits of SI and CI engines Two stroke engine construction and operation. Comparison of four- stroke and two-stroke engine operation, engine air capacity & volumetric efficiency, bp, ip & fp, bmep, imep, bsfc, isfc, sfc, various engine efficiencies,	5
2	**FUEL AIR CYLCLE, ACTUAL CYCLE AND THEIR ANALYSIS** Factors comparison of air standard and fuel air cycles, effect of operating variables on cycle analysis, difference between actual cycle and fuel cycle for SI and CI engines, Reason for variation of specific heats, Effect of specific heat on air standard cycle of otto and diesel cycles	4
3	**FUELS AND ITS SUPPLY SYSTEM FOR SI AND CI ENGINE:** Important qualities of IC engine fuels, rating of fuels, Carburetion, mixture requirement for different loads and speeds, simple carburetor and its working, types of carburetors, MPFI, types of injection systems in CI engine, fuel pumps and injectors, types of nozzles, spray formation	8
4	**COMBUSTION IN SI AND CI ENGINES:** Stages of combustion in SI engines, abnormal combustion and knocking in SI engines, factors affecting knocking, effects of knocking, control of knocking, combustion chambers for SI engines, Stages of combustion in CI engines, detonation in C.I. engines, factors affecting detonation, controlling detonation,	10

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	combustion chamber for SI and CI engine	
5	**IGNITION SYSTEM, & SUPERCHARGING SYSTEM** Battery and magneto ignition system, spark plug, firing order, Need for supercharging, Effect of supercharging, types of supercharger, methods of supercharging	4
6	**ENGINE LUBRICATION AND COOLING:** Function, Various lubricants, Lubrication system – wet sump and dry sump, splash type and force lubricating system and combine lubrication system, crankcase blow-by and ventilation, Need of cooling, Types of cooling systems – liquid and air cooled, comparison of liquid and air cooled systems,	6
7	**ENGINE EMISSION AND THEIR CONTROL:** Air pollution due to IC engines, Euro I to VI norms, HC, CO and NOx emission, catalytic convertor, DPF, SCR	4
8	**Engine testing and performance:** SI and CI engine testing as per IS 10000, measurement of friction power, heat balance sheet, measurement of air and fuel consumption, engine performance characteristics of SI & CI,	4

Learning Outcomes: - At the end of the course, student will be able to

- Understand various components of the engine and its functions.
- Understand the combustion in SI Engine
- Gain knowledge on combustion in CI Engine
- Understand the lubrication and cooling system in IC Engines.
- Understand the turbo, supercharging and scavenging system in IC Engines

Teaching & Learning Methodology:-

1. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & indicated weightage should be given to all topics while teaching and conduction of all examinations.
2. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
3. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and it will carries five marks in the overall internal evaluation.

Books Recommended:

1. Ganesan, V, Internal Combustion Engines, Tata McGraw Hill Book Co., 2003.
2. Rajput R.K. Internal Combustion Engines, Laxmi Publications (P) Ltd, 2006.
3. John B. Heywood, internal Combustion Engine Fundamentals, McGraw Hill Book, 1998.
4. B.P. Pundir Engine Combustion and Emission, 2011, Narosa Publishing House.
5. Mathur, M.L., and Sharma, R.P., A Course in Internal Combustion Engines, Dhanpat Rai Publications Pvt. New Delhi-2, 1993.
6. Willard W. Pulkrabek, Engineering Fundamentals of the Internal Combustion Engines, 2007, Second Edition, Pearson Prentice Hall

List of Open Source Software/learning website:

https://onlinecourses.nptel.ac.in/noc19_me10/preview

https://ocw.mit.edu/courses/mechanical-engineering/2-61-internal-combustion-engines-spring-2017/

Practical List:-

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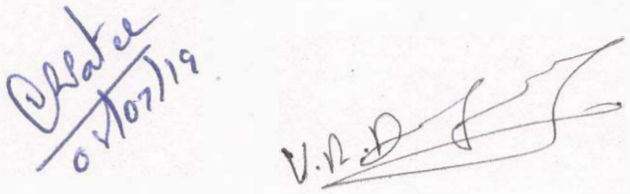
V.A.D.

1. Determination of valve timings for four stroke Petrol/Diesel Engine.
2. Study about ignition and governing system of I C engines.
3. Study about supercharging and turbo charging of I C engines.
4. Study about various methods for measurements and testing of I C engines.
5. Study about engine emissions and their control.
6. Performance test of 4 stroke Petrol Engine.
7. Performance test of 4 stroke Diesel Engine.

Major Equipment:

1. 4-stroke Petrol engine
2. 4-stroke Diesel engine
3. Cross-section/working model o engine
4. VCR (Variable Compression Ratio) engine



SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING

DEPARTMENT OF AUTOMOBILE ENGG.
AUTOMOBILE CHASSIS AND BODY ENGINEERING
CODE:_______
B.E. 5TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	0	0	3	3	30	0	70	0	100

Objective: - To present a problem oriented in depth knowledge of automobile chassis and body engineering

Prerequisites: - NA

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Vehicle Chassis:** Function and Classification of Vehicle Chassis based on structure design, Frame construction, Loads acting on vehicle structure, Materials for frame and frame defects.	06
2	**Vehicle Body:** Vehicle body structural design consideration. Methods for vehicle body construction, Geometry of vehicle body surfaces. Car Body: - Types of car body, Car body parts, Zones of car body, Identification and function of car body pressing, Sub-assemblies and body shell construction, Selection of body member sections, Load distribution on car body structure, Car structure analysis by simple structural surface (SSS) method, Heating and ventilation distribution in car body. Car body build, paint and sealing. Bus Body: Bus body classification based on body shapes, layout, capacity and size. Feature of bus body types. Heating and ventilation distribution system in bus body design.	14
3	**Vehicle body Materials:** Types of materials for vehicle body structure for car and bus, Material selection criteria , Application, Properties , production process for Steel, Al, Alloy, polymers and composites materials for car body building.	06

4	**Ergonomics and Vehicle Safety:** Requirement of vehicle body design based on ergonomics and safety. **Vehicle Safety:** Active safety system and Passive safety system. Vehicle safety system for door, window glasses, wind screen, bumper. Passive safety system s: Air bags, seat belts, passenger compartment integrity, child safety, crumple zone, crash resistant door pillers.Crash testing, protection of occupants and pedestrians. Testing for occupant safety. Active safety systems: Safety systems for improvement of visibility and night vision. Antilock braking system (ABS), Traction control System (TCS), Vehicle stability program (VSP/ESP), Adaptive cruise control system (ACC). **Ergonomics:** Ergonomic consideration for body design, Human characteristics and capabilities, Use of Anthropometric and biomechanics in designing seat, pedal control, interior dimensions. Concept of H-point referencing, Occupant packaging and driver packaging. Computer aided ergonomic design in automobile.	14
5	**Vehicle Aerodynamics:** Aerodynamics forces and moments: Types and effects, Vehicle Drag and reduction methods, Vehicle lift and reduction methods, Stability with cross wind. Wind tunnel testing, Aerodynamic noise and reduction techniques, Bus and Truck aerodynamics.	5

Learning Outcomes: - After learning the course the students should be able to:

1. Understand and have knowledge about different aspects related to body and chassis.
2. Understand various safety provisions.
3. Design the chassis and able to select the section of same.
4. Design the cabin and frame component to transfer the force.
5. Optimization from safety and cost point of view.

Teaching & Learning Methodology:-

1. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
2. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
3. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

Books Recommended:

1. Jnusz Pawlowski, "Vehicle Body Engineering", Business books limited.
2. J H Smith, "An Introduction to Modern Vehicle Design", Butterworth-Heinemann.
3. J Brown, A J Robertson, S Serphento, "Motor Vehicle Structure: Concepts and Fundamentals, Butterworth-Heinemann.
4. Heinz Heizler, "Advanced Vehicle Technology", Butterworth-, London.
5. David A. Crolla, "Automobile Engineering: Power train, chassis system and vehicle Body",Elsevier
6. V D Bhinse, "Ergonomics in Automotive Design", CRC Press.
7. SAE J4004
8. John Fenton, Handbook of Automotive Body and Systems Design, Wiley India.

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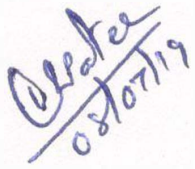
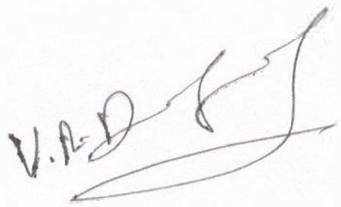
V.N.D

9. John Fenton, Handbook of Automotive Body Construction and Design Analysis, Wiley India.
10. ARAI / GTR for occupant and pedestrian protection

List of Open Source Software/learning website: http://nptel.iitm.ac.in/courses.php





SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF AUTOMOBILE ENGG.
AUTOMOBILE ELECTRICAL SYSTEM
CODE:
B.E. 5TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	ALA	Th	Pr	
3	0	2	5	4	30	50	70	-	150

Objective: - Automotive electrical systems including study o electrical laws, operational theory, testing, magnetism, diagnosis, and repair of batteries, charging and starting systems, and electrical systems accessories. Emphasis will be on electrical schematics, service manuals.

Prerequisites:- Basic knowledge of electrical systems

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Basics :** Storage, Distribution systems & Generation of electric energy, Lighting system, 12 Volt & 24 volt systems. Insulation and earth (negative and positive earthing) system, types of cables used, colour codes, cable connectors, wiring, fuse system, circuit breakers, Relays, Switches. Layout and Wiring diagram for 2, 3 and 4 wheeler vehicles, Buses and Commercial vehicles, types of horn & working principal.	6
2	**Battery system:** Various Types of Automotive batteries. Principles, Construction & working of lead acid battery, dry battery &Alkaline battery. Designations & Rating of Batteries. Performance tests: Battery Capacity, Efficiency, Gravimetric test and efficiency. Battery failures. Recharging: Electronic circuits, battery charging current, charging methodology & precautions.	6
3	**Starting system:** Principle, Starting torque, engine resistance torque, and power required for starting of engine. Starter motor and its circuit. Types of drive mechanisms: bendix drive, pinion type, axial sliding armature starter. Slipping and overrunning of clutches, automatic switches for starting, cold starting devices: Glow plug & choke	5
4	**Charging system:** Need. Charging circuit, Types of charging system: D.C. dynamo, AC dynamo, flywheel magneto charging system and Alternator (more	5

	emphasis on Alternators). Charging system controlling & regulator system: Relay/cut-out, voltage and current regulator, compensated voltage and current regulator, electronic regulator, regulator characteristics. Drive for Charging system.	
5	**Ignition system:** Requirements. Types of Ignition systems: Ballast Resistance, Ignition coil characteristics, Cam angle & contact angle gap, spark advance mechanism, spark plug, ignition timing, multi-cylinder distributor, Distributor (contact breaker ignition system), limitations of coil ignition system, electronic ignition systems. Voltage and current required for Spark. Spark Plug, characteristics, material, types, plug fouling.	6
6	**Lighting system:** Lighting system of vehicle, head lamp, tail lamp, brake lamp, parking lamp etc, other types of lamps used. Reflector purpose and design, head lamp angle and position, fog lamp, side indicator lamp, warning lights and flashers, instrument panel lights, body interior lights. Safety indicator lights. Engine compartment & Rear boot lamps.	4
7	**Electrical Equipments & Accessories:** Windscreen wipers, windscreen washers, power windows, doors locks, Rear wind shield glass heating system. Rear view mirror Adjusting, Day light regulating system. Central Locking system. Convertible Mechanism.	3
8	**Electronic systems:** for CRDI & MPFI engine injection system regulation, control & Management. ECU for Engine, ABS and On Board Diagnostic (OBD) systems. Electronic power steering.	5
9	**Electrical system for Climate Control system:** Air conditioning, Heating& defrosters.	2
10	Introduction to Microprocessors, Micro controllers, PLC - Structure and programming applications in Automobiles.	3

Learning Outcomes: - After learning the course the students should be able to

1. Understand the basic auto electrical systems. 2. Understand the layout of wiring and connections of electrical systems in automobiles. 3. Understand the working of different electrical components and latest technology used in automobiles.

Teaching & Learning Methodology:-

lt is theoretical subject with application of Electrical diagram of Automobile. So following teaching methodology should be appropriate.

1. Classroom Communication
2. Presentation of various charts as well as practical session arrangement.
3. Interactive Learning Methods

08/07/19

V.D.

Books Recommended:

Text Books :

1. Automobile Electrical and Electronics, by A. L. Statini, Delmar Publications.
2. Automotive Electrical Equipments, by P. L. Kohli, Tata McGraw Hill Pub. Co. Ltd.

Reference Books:

1. Automobile Electrical & Electronic Systems, by Tom Denton, Allied Publishers Pvt. ltd., Chennai.

2. Automobile Electrical & Electronic Equipments, by Young, Griffithe, The English Language Book Co., London.

3. Understanding Automotive Electronics, by Bechfold SAE Publications

5. Fundamentals of Automotive Electronics, by V.A.W.Hilliers, Hatchin, London

6. Automotive Computer & Control System, by Tomwather J. R., Cland Hunter, Prentice Hall NJ

7. Understanding Automotive Electronics, by Wiliam B. Ribbens, Allied Publishers Pvt. ltd. Chennai 8. Automotive mechanics by W. Crouse, TM

List of Open Source Software/learning website: http://youtube.com/techtrixinfo

Practical List:-

1. Introductory study of automobile electrical systems.
2. Study of automobile battery System.
3. Study of electrical engine starting system.
4. Study of different types of battery charging system.
5. Study of different types of ignition systems.
6. Study of automobile lighting system.
7. Study of different types of gauges, sensors and meters of an automobile.
8. Study of various electrical equipments like Windscreen wipers, power windows, Rear wind shield glass heating system, Central Locking system.

08/07/14

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY
DEPARTMENT OF INFORMATION TECHNOLOGY
Object Oriented Programming with JAVA
CODE: 2304050 1
B.E. 5th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
4	-	4	8	6	30	50	70	-	150

Objective: To understand the concept of object oriented programming. This course Provide fundamental knowledge of the various aspects of java programming and enables students to appreciate recent development in the area.

Prerequisites: Object Oriented Programming concepts

Course outline:

Sr. No.	Course Contents	Number of Hours
1	**Basics of JAVA:** Features of Java, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Control Statements – If , else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue.	03
2	**Array and String:** Single and Multidimensional Array, String class, String Buffer class, Operations on string, Command line argument, Use of Wrapper Class.	04
3	**Classes, Objects and Methods:** Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class ,Abstract class.	06

4	**Inheritance and Interfaces:** Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, method overriding, super keyword ,Final keyword, Creation and Implementation of an interface , instanceof operator, Interface inheritance, Dynamic method dispatch ,Comparison between Abstract Class and interface	06
5	**Package:** Use of Package, CLASSPATH, Import statement, Static import, Access control	04
6	**Exception Handling:** Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class	05
7	**Multithreaded Programming:** Use of Multithread programming, Thread class and Runnable interface , Thread priority, Thread synchronization , Thread communication, Deadlock	05
8	**IO Programming:** Introduction to Stream, Byte Stream, Character stream, Readers and Writers, File Class, File InputStream, File OutputStream, InputStreamReader, OutputStreamWriter, FileReader, FileWriter, BufferReader	05
9	**Collection Classes :** List, Abstract List, Array List, Linked List, Enumeration, Vector, Properties, Introduction to java.util package.	05
10	**Networking with java.net:** InetAddress class ,Socket class, Datagram Socket class, Datagram Packet class	05

Learning Outcomes:

After successful completion of the course students should be able to:

1. Understand object oriented programming concepts and implement in java.
2. Compare building blocks of OOPs language, inheritance, package and interfaces.
3. Identify exception handling methods.
4. Implement multithreading in object oriented programs.

Teaching & Learning Methodology:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
2. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
3. Experiments shall be performed in the laboratory related to course contents.

Books Recommended:

1. Java Fundamentals A comprehensive introduction By Herbert Schildt, Dale Skrien, McGraw Hill Education.
2. Programming with Java A Primer – E.Balagurusamy,,McGraw hill Education.
3. The Complete Reference, Java 2 (Fourth Edition),HerbertSchild, - TMH.
4. Programming with Java, M. P. Bhave S.A. Patekar, Pearson.
5. Introduction to Java Programming 7th ed., Y. Daniel Liang, Pearson.

E-Resources:-

1. Java Development Kit: http://www.oracle.com/technetwork/java/javase/downloads/index.html
2. http://docs.oracle.com/javase/specs/jls/se7/html/index.html
3. http://docs.oracle.com/javase/tutorial/java/index.html
4. http://www.javatpoint.com/
5. http://www.tutorialspoint.com/java/
6. http://www.learnjavaonline.org/
7. http://www.c4learn.com/javaprogramming/
8. http://www.learn-java-tutorial.com/

Practical List:-

Sr. No.	Practical
1.	Display greatest number from three numbers.
2.	To check given number is prime or not.
3.	To reverse the given number.
4.	Display Fibonacci series.
5.	To print given pattern on screen. 1 2 3 4 3 2 1 1 2 3 3 2 1 1 2 2 1 1 1
6.	To search an element from an array.
7.	Sort the array in ascending order.
8.	Multiplication of 3X3 matrices.
9.	Create a class Calculator with arithmetic functions such as addition, subtraction, multiplication, and division.
10.	Create a class Time with hours, minutes, and seconds as member variables and calculate sum of two Time objects.

11.	Create a class named Student. Create a class named Test .To calculate mark of students create other class Result which is inherited from Student and Test.
12.	Create a class which can perform following tasks using method overloading a) Addition of two float values b) Addition of two arrays. c) Addition of two Strings
13.	Write an OOP to demonstrate use of following functions of String class 1) getChars() 2) equals() 3) equalsIgnoreCase() 4) startsWith() 5) endsWith() 6) subString()
14.	Write an OOP to demonstrate use of following functions of StringBuffer class 1) deleteCharAt() 2) insert()
15.	Write an OOP to sort list of strings in alphabetical order.
16.	To catch Arithmetic Exception such as division by zero
17.	To catch multiple exceptions such as ArrayIndexOutOfBoundsException , NumberFormatException, NullPointerException.
18.	Write an OOP To throw your own exception
19.	Write an OOP for copying character from one file to another.
20.	Write an OOP for writing bytes to file
21.	Write an OOP for reading bytes from a file
22.	Write an OOP for copying bytes from one file to another.
23.	Write an OOP for reading and writing primitive datatype.
24.	Write an OOP for reading and writing using a random access file.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

Computer Graphics & Visualization
CODE: 2304O506
B.E. 5th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives: The goal of this course is to provide an introduction to the theory, algorithms and concepts of computer graphics.

Prerequisites: Student should have programming knowledge of C/C++. Familiarity with the concepts of mathematics like coordinate geometry and algebra is required.

Course outline:

Sr. No.	Course Contents	Number of Hours
1	**Introduction to Graphics:** Applications, graphics input devices, display devices (CRT, Color CRT Monitors, DVST and Flat Panel Displays), Introduction to Raster & Random Scan display, graphics s/w and standards.	06
2	**Output Primitives:** Scan Conversion: Point, Line, Circle and ellipse (algorithms). Introduction to Aliasing and Anti Aliasing.	08
3	**Filled area primitives:** Polygon Drawing, Types of polygon, Inside-outside test (Odd-Even rule, winding number), Scan line polygon filling, Boundary fill, Flood fill.	08

4	**2D Transformation and Viewing: :** Basic Transformation: Translation, scaling, rotation, matrix representation, homogeneous coordinates, composite transformations Other transformation: Shear, Reflection, Viewing and Clipping: Viewing pipeline and Coordinates system, Window to viewport coordinate transformation, Point Clipping, Line Clipping: (Cohen-Sutherland, Liang-barsky, NLN), Polygon Clipping: Sutherland-Hodgeman Polygon Clipping and Weiler Atherton Polygon Clipping.	10
5	**Advanced topics :** Visible surface detection method: Back-face detection, Depth buffer Method, Scan line, Depth sorting. Light Rendering: Basic illumination model, Diffuse reflection, Specular reflection, Phong shading, Gouraud shading, Color models like RGB, YIQ, CMY, HSV.	08

Learning Outcomes:

Students should be able to know the working of input-output devices. They should know the basics of object drawing. Students should be able to understand and implement different algorithms used to draw geometrical shapes in graphics. Understand the basic knowledge of co-ordinates and clipping algorithms.

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
2. The course includes a laboratory, where students have an opportunity to build an application for the concepts being taught in lectures
3. Experiments shall be performed in the laboratory related to course contents

Books Recommended:

1. Donald Hearn and M. Pauline Baker, Computer Graphics- C Version, PHI/Pearson Education
2. J. D. Foley, S. K Feiner, A Van Dam F. H John, Computer Graphics: Principles & Practice in C, Pearson Education.

Practical List:

Sr. No.	Practical
1	Write a program to draw Smiley using language C.
2	Write a program to DDA Line Drawing Algorithm.
3	Write a program to Bresenham's Line Drawing Algorithm.
4	Write a program to Midpoint Circle Algorithm..
5	Write a program to Midpoint ellipse Algorithm.
6	Write a program to 2D Translation Triangle Program.
7	Write a program to 2D Rotation of Triangle Program.
8	Write a program to 2D Scaling Triangle Program.
9	Write a program to draw a moving person.
10	Project I (e.g. Screensaver,Moving Ship etc.)

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

Information Network and Cyber Security

CODE: 2304050 3

B.E. 5th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives: To provide an understanding of principal concepts, major issues, technologies and basic approaches in information security. Gain familiarity with prevalent network and distributed system attacks, defenses against them and forensics to investigate the aftermath.

Prerequisites: Operating System and Computer Network

Course outline:

Sr. No.	Course Contents	Number of Hours
1	Symmetric Cipher Model, Cryptography, Cryptanalysis and Attacks; Substitution and Transposition techniques, Public and Private key cryptography	06
2	Stream ciphers and block ciphers, Block Cipher structure, Data Encryption standard (DES), AES with structure, its transformation functions, Cipher Block Chaining Mode	07
3	RSA algorithm, Diffie-Hillman Key Exchange algorithm, MIME	04
4	Simple hash functions, its requirements and security, Hash functions	05
5	Digital Signature, Key management and distribution, Web Security and SSL	05
6	Systems Vulnerability Scanning, Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall	05
7	Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL Injection, Buffer Overflow.	07

Learning Outcomes:

After successful completion of the course students should be able to:

1. Understand and apply the various symmetric and Asymmetric key algorithms.
2. Understand the concepts of hashing with algorithms and Digital Signature.
3. Understand cyber-attack, types of cybercrimes also how to protect them self and ultimately society from such attacks
4. To get Knowledge of Cyber security Tools.

Teaching & Learning Methodology:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Books Recommended:

1. Cryptography and Network Security, Principles And Practice Sixth Edition, William Stallings, Pearson.
2. Cryptography and Network Security Atul Kahate, TMH
3. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication McGraw Hill.

E-Resources:

1. Software: cryptool (www.cryptool.org)
2. Software: Wireshark (www.wireshark.org)
3. https://www.owasp.org/index.php/Category:OWASP_Top_Ten_Project

Practical List:

Sr. No.	Practical
1	Implement Caesar cipher encryption-decryption.
2	Implement Polyalphabetic cipher encryption-decryption.
3	Write a program to generate SHA-1 hash.
4	Study and use the Wireshark for the various network protocols.
5	TCP scanning using NMAP
6	Port scanning using NMAP
7	Web application testing using DVWA
8	Manual SQL injection using DVWA

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

IT Industry Management with ERP

CODE: 2302050I

B.E.: 5th Semester

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objectives:

Understand and analyze various components of IT Infrastructure and emerging technologies used in Business and to learn to develop and coordinate IT systems strategies, plans and management initiatives within small, medium and large corporate enterprises.

Prerequisites:

Basics of Technology Trends in IT

Course Outline:

Sr.No.	Course Contents	Number of Hours
1	**IT Infrastructure and Emerging Technologies:** IT Infrastructure and Platform Trends, The Emerging Mobile Digital Platform, Contemporary, Software Platform, Mashups and Widgets, Software Outsourcing and Cloud Services, Management Issues , Trends like Big Data, Cloud Computing and Services.	4
2	**Foundations of Business Intelligence: Databases and Information Management:** Organizing Data in a Traditional File and the Database Approach to Data Management Using Databases to Improve Business Performance and Decision Making: Data Warehouses, Tools for Business Intelligence, Multidimensional Data Analysis, and Data Mining Establishing an Information Policy, Ensuring Data Quality.	5

3	**Securing Information Systems:** System Vulnerability and Abuse, Business Value of Security and Control: Information Protection Laws in the Arab World, Electronic Evidence and Computer Forensics. Establishing a Frame work for Security and Control, Technologies and Tools for protecting information Resources.	4
4	**Achieving Operational Excellence:** Enterprise Systems: What Are Enterprise Systems? , Enterprise Software Business Value of Enterprise Systems, Lifecycle, Cost Estimation, Benefits Realization. Enterprise Applications: New Opportunities and Challenges ,Enterprise Application Challenges	5
5	**ERP Introduction:** Origin, Evolution and Structure and Benefits: Conceptual Model of ERP, Scenario and Justification of ERP in India, Various Modules of ERP, Advantage of ERP	5
6	**Advancement of IT and Impact on organizations Data Management:** Data ware Housing, Data Mining, Online Analytic Processing (OLAP), Product Life Cycle Management (PLM)	2
7	**Managing Information Systems Projects:** The Importance of Project Management: Runaway Projects and System Failure, Project Management Objectives, Selecting Projects: Management Structure for Information Systems Projects, Establishing the Business Value of Information and Managing Project Risk Change Management and Configuration Management.	4
8	**IT Ethics,** Legislation and Outsourcing : Introduction, Legislation act and outsourcing and Integrating System Management Processes	2

Learning Outcomes:

After successful completion of this course, student will be able to

1. Analyze the performance and operational excellence in business.
2. Study concerns in business like ethics, security, finance in corporate IT systems.
3. Understand different enterprise application, rationale for acquiring and implementing ERP systems, selection of ERP software, and integration of processes and transactions in the ERP system.
4. Selection of ERP software, and integration of processes and transactions in the ERP system.

Teaching & Learning Methodology:

For teaching this subject power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work.

Books Recommended:

1. Rich Schiesser, IT Systems Management, Prentice hall
2. Ken Laudon, Jane Laudon and Rajanish Dass, Management Information System, Pearson
3. Sjaak Laan, It Infrastructure Architecture - Infrastructure Building Blocks and Concepts ,Lulu Press
4. Prof Phalguni Gupta, Mr. Surya Prakash, Umarani Jayaraman IT Infrastructure and its Management Paperback, Tata McGraw Hill education Pvt ltd
5. Ross J. Anderson, Security Engineering: A Gulde to Building Dependable Distributed Systems, Wiley
6. Alexis Leon,Enterprise Resource Planning ,McGraw Hill
7. David L.Olson, Managerial Issues of Enterprise Resource Planning Systems, McGraw Hill

E-Resources:

1. https://solutiondots.com/usa/blog/erp-cloud/brief-introduction-enterprise-resource-planning-erp/
2. https://financesonline.com/erp-software-analysis-features-types-benefits-pricing/
3. https://www.techopedia.com/definition/29199/it-infrastructure
4. https://www.oracle.com/applications/erp/what-is-erp.html

Practical List:

1. Simulating business processes of an Enterprise.
2. Designing a web portal for an Enterprise using E-business Models.
3. To implement E-procurement model.
4. Study of Open source ERP.
5. Study of Cloud ERP.
6. Business process agility.
7. Design of SCM model.
8. Implementing Business Intelligence.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

BIG DATA MANAGEMENT

CODE: 2304O608

B.E. 5th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives: To understand the basic concepts of Big Data and foundation for understanding how data managing using bigdata concepts. This course provides to enables students to appreciate recent developments In the area. The course will be driven from the engineering perspective.

Prerequisites: Basic Knowledge of Database Management System and RDBMS.

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	**INTRODUCTION TO BIG DATA** Introduction– distributed file system–Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce.	05
2	**INTRODUCTION TO HADOOP AND HADOOP ARCHITECTURE** Big Data – Apache Hadoop & Hadoop Ecosystem, Moving Data in and out of Hadoop – Understanding inputs and outputs of Map Reduce -, Data Serialization.	10
3	**HDFS, HIVE AND HIVEQL, HBASE** HDFS-Overview, Installation and Shell, Java API; Hive Architecture and Installation, Comparison with Traditional Database, HiveQL Querying Data, Sorting And Aggregating, Map Reduce Scripts, Joins& Sub queries, HBase concepts, Advanced Usage, Schema Design, Advance Indexing, PIG, Zookeeper , how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.	05
4	**SPARK** Introduction to Data Analysis with Spark, Downloading Spark and Getting Started, Programming with RDDs, Machine Learning with MLlib.	09

5	**NoSQL** What is it?, Where It is Used Types of NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL, NewSQL	04
6	**Data Base for the Modern Web** Introduction to MongoDB key features, Core Server tools, MongoDB through the JavaScript's Shell, Creating and Querying through Indexes, Document-Oriented, principles of schema design, Constructing queries on Databases, collections and Documents , MongoDB Query Language	06

Learning Outcomes:

1. Students will to build and maintain reliable, scalable, distributed systems with Apache Hadoop and also able to design and learn MongoDB query language. They also understand the difference between SQL and NOSQL.
2. Students will learn tips and tricks for Big Data uses and solutions.

Teaching & Learning Methodology:

Big Data Analytics allows measuring, monitoring and responding in real time. After delivering theory hands-on practical should be learnt by students.

Books Recommended:

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions",Wiley.
2. Chris Eaton,Dirk derooset al. , "Understanding Big data ", McGraw Hill.
3. BIG Data and Analytics , Sima Acharya, Subhashini Chhellappan, Willey.
4. Tom White, "HADOOP: The definitive Guide", O Reilly.

E-Resources:

1. http://www.bigdatauniversity.com/
2. https://in.reuters.com/tools/rss
3. https://www.altova.com/xmlspy-xml-editor
4. https://www.w3.org/RDF/

List of Experiments:

1. To understand the overall programming architecture using Map Reduce API.
2. Store the basic information about students such as roll no, name, date of birth , and address of student using various collection types such as List, Set and Map.
3. Basic CRUD operations in MongoDB.
4. Retrieve various types of documents from student's collection.
5. To find documents from Students collection.
6. Develop Map Reduce Work Application.
7. Creating the HDFS tables and loading them in Hive and learn joining of tables in Hive.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

MOBILE APPLICATION DEVELOPMENT TECHNOLOGIES

CODE: 2308503

B.E.: 5th Semester

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives: Android programming is a hands-on course which is designed for providing essential skills and experiences to the learners in developing applications on mobile platform. The hands-on training is effective for beginners to learn practical Android code application. Throughout the duration of program, the students are engaged into development of a real-life application which acts as a basic for future projections. Eclipse and SDK are used as the development environment.

Prerequisites:

Need basic Knowledge of concepts of Object Oriented Programming and Java.

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	**Introduction to ANDROID :** ANDROID SDK Features, Introduction to Development Features, Basics of ANDROID, Developing for ANDROID, development for mobile and embedded devices, ANDROID development tools, Creating Applications using ANDROID, Basics of an ANDROID application, introduction to manifest, externalizing resources, application life cycle, ANDROID activities.	06

2	**Building user Interfaces :** Introduction to layouts, introduction to fragments, creating new views, introduction to adapters, Intents and broadcast receivers, Introduction to intents, creating intents and broadcast receivers, Using Internet resources.	09
3	**Files, saving state and preferences :-**Creating, saving and retrieving shares preferences, including static files as resources, working with the file system Database and content providers : Introducing ANDROID databases, content values and cursors, working with SQLite databases, creating content providers, using content providers, native ANDROID content providers.	10
4	**Working in background** Introducing services, using background threads, using alarms Enhancing user experience, Introduction and addition of action bar, menus and dialogs, drawables and gradients, custom animations. **Maps and location based services (**Using location based services, selecting a location provider, finding your current location, creating map based activities).	07
5	**Audio, video and using the camera** Playing audio and video, manipulating raw audio, using camera to take pictures, recording video, adding media to media store **Telephony and SMS** Hardware support for telephony, using telephony, introducing SMS and MMS **Monetizing, promoting and distributing the applications** Signing and publishing applications, distributing applications, introduction to monetizing applications	07

Learning Outcomes:

By completion of this course a learner should be able to:

1. Build and deploy their Android application.
2. Learners understand the operation of the application, application lifecycle, configuration files, intents, and activities.
3. The candidates get a better understanding of the components, layouts, event handling, and screen orientation.
4. Learners also develop a working knowledge of the custom UI elements and positioning.
5. The candidates may also have an in-depth understanding of broadcast receivers and services.

Teaching & Learning Methodology:

The course content should be taught and implemented with the aim to develop required skillsin the students so that they are able to acquire following competency:
Develop GUI based mobile applications with Eclipse Android SDK on opensource Android and propriety platforms with database connectivity.

1) ANDROID Studio [Latest Version]
2) ANDROID Version [Jelly Bean and later]

Books Recommended:

1. Professional Android Application Development, Reto Meier, Wiley India Pvt Ltd.
2. Beginning Android, Mark L Murphy, Wiley India Pvt Ltd.
3. Professional Android, Sayed Y Hashimi and SatyaKomatineni, Wiley India Pvt Ltd.

E-Resources:

Additional Resources of Android that can be used for conducting Practical as well as case studies:

1. Developing Andriod Apps- Udacityhttps://www.udacity.com/course/ud853
2. Build your first App http://developer.android.com/training/basics/firstapp/index.html
3. Android App Development Tutorial http://www.codelearn.org/androidtutorial
4. ADT Plugin http://developer.android.com/tools/sdk/eclipse-adt.html
5. Installing the Eclipse Plugin http://developer.android.com/sdk/installing/installing-adt.html
6. Eclipse Download https://www.eclipse.org/downloads/

Practical List:

Sr. No.	Practical
1	Introduction to android operating system and study of basic widgets.
2	Study of android lifecycle and demonstration of it.
3	Program for First Android Application.
4	Program for developing an Android Application using a linear layout.
5	Study of intents and types of intents
6	Study of list views and adapters
7	Study of dialog interfaces in android
8	Study of Services in android
9	Study of android database (SQlite)
10	Mini Project

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY
DEPARTMENT OF INFORMATIONTECHNOLOGY
IMAGE PROCESSING
CODE: 2304050 7
B.E.: 5th Semester

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objective:

The course contains the study of image fundamentals and mathematical transforms necessary for image processing. It gives the different techniques of image enhancement and image restoration procedures. It gives knowledge to students about image compression procedures.

Prerequisites:

Digital Signal Processing and Transform techniques.

Course Outline:

Sr.No.	Course Contents	Number of Hours
1	**Introduction and Digital Image Fundamentals** Digital Image Fundamentals, Human visual system, Image as a 2D data, Image representation – Gray scale and Color images, image sampling and quantization.	6
2	**Image enhancement in Spatial domain:** Basic gray level Transformations, Histogram Processing Techniques, Spatial Filtering, Low pass filtering, High pass filtering.	6
3	**Image Restoration and Reconstruction:** Noise Models, Noise Reduction, Inverse Filtering, MMSE (Wiener) Filtering.	6
4	**Color Image Processing:** Color Fundamentals, Color Models, Pseudo color image processing	4

5	**Image Compression:** Fundamentals of redundancies, Basic Compression Methods: Huffman coding, Arithmetic coding, LZW coding, JPEG Compression standard	6
6	**Morphological Image Processing:** Erosion, dilation, opening, closing, Basic Morphological Algorithms: 04 08 hole filling, connected components, thinning, skeletons	6
7	**Image Segmentation:** point, line and edge detection, Thresholding, Regions Based segmentation, Edge linking and boundary detection, Hough transform	6

Learning Outcomes:

After successful completion of this course, student will be able to:

1. Apply knowledge of mathematics for image understanding and analysis.
2. Design and analysis of techniques / processes for image understanding.
3. Design, realize and troubleshoot various algorithms for image processing case studies.

Teaching & Learning Methodology:

For teaching this subject we use MATLAB with projector in computer lab.

Books Recommended:

1 Gonzalez & Woods, —Digital Image Processing , 3rd ed., Pearson education, 2008

2. Jain Anil K., —Fundamentals Digital Image Processing , Prentice Hall India, 2010

3 Milan Sonka, Vaclav Hlavav, Roger Boyle, —Image Processing, Analysis and Machine Vision , 2nd ed., Thomson Learning, 2001

4. Rangaraj M. Rangayyan, —Biomedical Image Analysis , CRC Press, 2005

5. Pratt W.K, —Digital Image Processing , 3rd ed., John Wiley & Sons, 2007

Practical List:

Sr. No.	Practical
1	Introduction to Image Processing Toolbox.
2	To create a program to display grayscale image using read and write operation.
3	To create a program to rotate an image.
4	To create a vision program to find histogram value and display histograph of a grayscale and color image.
5	To create a vision program to determine the edge detection of an image using different operators.
6	To create a program to eliminate the high frequency components of an image.
7	To create a color image and perform read and write operation.
8	To obtain the R, B, G color values and resolved color values from a color box by choosing any color.
9	To create a program for segmentation of an image using watershed transforms.
10	Implement Image compression using DCT Transform.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

ADVANCE WEB TECHNOLOGY

CODE: 2308060l

DEGREE: 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives:

LAMP is an Open Source Web Development platform that uses Linux as an operating system, Apache as web server, MySQL as a Relational Database Management System and PHP as an Object Oriented Scripting Language. This subject covers the wide range of web technologies both client side and server side to provide the exposure to the students to develop Rich Internet Applications using them.

Prerequisites:

Knowledge of HTML, CSS, JAVASCRIPT and basic of LAMP (Linux, Apache, MySQL, PHP) to design static as well as Dynamic web pages. We can use Windows Operating system instead of Linux.

Course Outline:

Sr.No.	Course Contents	Number of Hours
1	**INTRODUCTION:** Concept Of Internet, Introduction of HTML, XHTML, CSS and JavaScript.	6
2	**XML:** Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Well formed, using XML with application. XML, XSL and XSLT. Introduction to XSL, XML transformed simple example, XSL elements, transforming with XSLT.	8
3	**INTRODUCTION OF PHP** : History of PHP, Apache Web Server, MySQL and Open Source,Relationship between Apache, MySQL and PHP (AMP Module),PHP configuration in IIS, Apache Web server	6

4	**BASICS OF PHP :** PHP structure and Syntax, Creating the PHP pages, rules of PHP syntax, Integrating HTML with PHP, Constants, Variables : static and global variable, Conditional Structure & Looping, PHP Operators, Arrays, foreach constructs, User defined function (argument function, Variable function, Return Function, default argument, variable length argument).	7
5	**INTRODUCTION TO MYSQL :** MySQL structure and syntax, Types of MySQL tables and storages engines, MySQL commands, Integration of PHP with MySQL, Connection to the MySQL server, Working with PHP and arrays of data, Referencing two tables , Joining two tables	7
6	**WORKING WITH DATABASE :** Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table ,names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs.	7

Learning Outcomes:

After successful completion of this course, student will be able to

1. Understand the basic structure of web designing technology.
2. Apply the concepts of web technology in designing static and dynamic web pages.
3. Design interactive web pages incorporating validation techniques.
4. We can save the data into database and get data when necessary.

Teaching & Learning Methodology:

For teaching this subject we use notepad or notepad++ or dream viewer or net beans software, Apache Server to store, process and deliver Web pages to clients.

Books Recommended:

1. Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India
2. Web Technologies, Black Book, dreamtech Press
3. HTML 5, Black Book, dreamtech Press
4. Web Design, Joel Sklar, Cengage Learning
5. Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel, Pearson

E-Resources:

Server software XAMPP/WAMP/LAMP

www.apachefriends.org

www.w3.org

www.w3schools.com

Practical List:

Sr. No.	Practical
1	Creating the PHP page.
2	Programs using arrays and control and loop structures
3	Testing different PHP functions and user define function
4	Creating forms using buttons, textboxes and other form elements. Use ($_POST and $_GET to retrieve data.)
5	Passing hidden information to the form processing script via hidden form controls and a URL query string.
6	Creating forms with sessions and cookies
7	Allowing the user to upload their own images
8	View the data contained in the My SQL database.
9	Connect to the database from your website.
10	Create small project which include database connectivity, transection and dynamic web pages.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

Data Mining and Warehousing

CODE: 2.3CU604

B.E. 6th SEMESTER

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives: - This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts.

Prerequisites: - basic of Database Management System

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	Overview, Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.	07
2	Concept Description: Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central	06

	Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi- Dimensional Association rules from Relational Databases	
3	What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbour classifiers, Genetic Algorithm. Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis	10
4	Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi-Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mining.	10
5	Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.	07

Learning Outcomes:-

After learning the course the students should be able to:

1. Students will be able to use mining tool.
2. Students are able to perform various data warehouse related exercise.

Teaching & Learning Methodology:-

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- Experiments shall be performed in the laboratory related to course contents
- Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work

Books Recommended:-

1. Data Warehousing in the Real World – Anahory and Murray, Pearson Education.
2. Data Mining – Concepts and Techniques – Jiawai Han and Micheline Kamber.
3. Building the Data Warehouse – WH Inmon, Wiley.

E-Resources:-

1. NPTEL Online course

List of Experiments:-

Assignments based on above course content will be given to the students at the end of each chapter. Each assignment contains minimum 5 questions.

Quizzes and Surprise tests will be conducted for testing the knowledge of students for particular topic.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

Cloud Computing
CODE: 2810603
B.E. 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives: To get familiar with cloud computing fundamentals, architecture, services, implementation and deployment techniques etc.

Prerequisite: Fundamentals of Distributed Computing and Operating Systems

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Introduction to Cloud Computing:** Overview, Roots of Cloud Computing, Layers and Types of Cloud, Desired Features of a Cloud, Benefits and Disadvantages of Cloud Computing, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks.	06
2	**Cloud Architecture, Services and Applications:** Exploring the Cloud Computing Stack, Connecting to the Cloud, Infrastructure as a Service, Platform as a Service, Saas Vs. Paas, Using PaaS Application Frameworks, Software as a Service Cloud Deployment Models, Public vs Private Cloud, Cloud Solutions, Cloud ecosystem, Service management, Computing on demand, Identity as a Service, Compliance as a Service.	08

3	**Abstraction and Virtualization:** Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hyper visors, Understanding Machine Imaging, Porting Applications, Virtual Machines Provisioning and Manageability Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action, Provisioning in the Cloud Context , Virtualization of CPU, Memory, I/O Devices, Virtual Clusters and Resource management, Virtualization for Data Center Automation.	07
4	**Cloud Infrastructure and Cloud Resource Management:** Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources. Administrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards	07
5	**Cloud Security:** Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Cloud computing security architecture: Architectural Considerations, General Issues Securing the Cloud, Securing Data, Data Security, Application Security, Virtual Machine Security	08
6	**Mobile Cloud Computing:** Introduction, Definition, Architecture, Benefits, challenges in mobile and at cloud shield	03

Learning Outcomes:

After completion of the course the learner should be able to:

1. Differentiate different computing techniques.
2. Compare various cloud computing providers/ Software.
3. Handle Open Source Cloud Implementation and Administration.
4. Understand risks involved in cloud computing.

Teaching & Learning Methodology:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
2. The course includes a laboratory, where students have an opportunity to build an application for the concepts being taught in lectures
3. Experiments shall be performed in the laboratory related to course contents.

Books Recommended:

1. Cloud Computing Principles and Paradigms, Rajkumar Buyya, Wiley
2. Distributed and Cloud Computing, Kai Hwang, MK Publication
3. Cloud computing Black Book, Dreamtech Publication
4. Rajkumar Buyya et. el., Cloud Computing: Principles and Paradigms, Wiley India Edition
5. Sosinsky B., Cloud Computing Bible, Wiley India
6. Mastering Cloud Computing by Rajkumar Buyya, C. Vecchiola & S. Thamarai Selvi, McGraw Hill
7. Miller Michael, "Cloud Computing: Web Based Applications that Change the Way You Work and Collaborate Online", Pearson Education India
8. Velte T., Velte A., Elsenpeter R., "Cloud Computing – A practical Approach", Tata McGraw Hill

E-Resources:

1. http://www.njit.edu/education/pdf/academic-integrity-code.pdf
2. CloudSim 3.0.3
3. http://www.cloudbus.org/
4. https://aws.amazon.com/
5. http://aws.amazon.com/documentation/
6. http://docs.aws.amazon.com/IAM/latest/UserGuide/getting-started.html

Practical List:-

Sr. No.	Practical
1	Sketch out and analyze architecture of Aneka / Eucalyptus / KVM identify different entities to understand the structure of it.
2	Create a scenario in Aneka / Eucalyptus to create a datacenter and host. Also create virtual machines with static configuration to run cloudlets on them.
3	Make and perform scenario to pause and resume the simulation in Aneka / Eucalyptus entity, and create simulation entities dynamically.
4	Organize a case in Aneka / Eucalyptus for simulation entities in run-time using a its toolkit support and manage virtual cloud.
5	Sketch out and analyze architecture of Microsoft Azure.
6	Sketch out and analyze architecture of Amazon Web Service (AWS).
7	Categorize Microsoft Azure Services and discuss on each.
8	Categorize Amazon Web Service (AWS) and implement its various cloud entities using its Cloud Toolbox support
9	Implement and use sample cloud services with the help of Microsoft Azure.
10	Create a sample mobile application using Microsoft Azure account as a cloud service. Also provide database connectivity with implemented mobile application.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY
DEPARTMENT OF INFORMATION TECHNOLOGY
Software Engineering
CODE: 2308603
B.E.: 6th Semester

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives:

To teach students the formal approach of software development. In this approach student will learn various software development models, processes, diagrams and project management as per software engineering standards. At the end student should be able to deal with real life problems related to software development.

Prerequisites: Basic knowledge of software development.

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	**Software process Models and lifecycle:** Software Product, Product, Software Processes, Evolving Role of Software, Software Engineering: A Study of different Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Process Models, Process, Product and Process, Object Oriented Software Engineering.	5
2	**Project Management Concepts & Project Metrics:** The Management Spectrum, People, Product, Process, Project, The W5HH Principle, Metrics in the Process and Project Domains (FP & LOC), Software Measurement, Metrics for Project and Software Quality.	5

3	**Software Project Planning, Scheduling and Tracking:** Project Planning Objectives, Software Project Estimation using COCOMO Model, Software Scope and Resources, Empirical Estimation Models, Basic Concepts and Relationship Between People and Effort, Defining a Task Set for the Software Project, Selecting Software Engineering Tasks, Defining a Task Network and Scheduling, Earned Value Analysis.	4
4	**Software Requirements Specification:** Requirement Gathering and Analysis, Software Requirement Specification (SRS), Formal requirements specification and verification - axiomatic and algebraic specifications.	3
5	**Analysis Modeling, Software Design Concepts and Principles:** The Elements of the Analysis Model, Data Modeling, Functional Modeling and Information Flow, Behavioral Modeling and Structured Analysis, Software Design and Software Engineering, The Design Process, Design Principles, Design Concepts, Modular Design, Design Heuristics for Effective Modularity, The Design Model ,Design Documentation, Object Modeling using UML, Software Architecture and Data Design, Architectural Styles	4
6	**User Interface Design, Component Level Design:** User Interface Design, Task Analysis and Modeling, Interface Design Activities and Implementation Tools, Design Evaluation, Structured Programming and Comparison of Design Notation	5
7	**Risk Analysis & Management:** Reactive versus Proactive Risk Strategies, Software Risks (Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation)	3
8	**Coding, Software Testing Techniques & Software Testing Strategies:** Software Testing Fundamentals and Test Case Design, White-Box Testing and Black-Box Testing, ISO/IEC/IEEE Software Testing standards, Testing for Specialized Environments, Unit Testing, Integration and Validation Testing, Software Documentation and Debugging Techniques.	3
9	**Software Quality Assurance and Configuration Management** - Quality Concepts and Software Quality Assurance, Quality Planning and Control, Software Reviews (Formal Technical Reviews), Software Reliability and Fault Tolerance, The SCM Process Identification of Objects in the Software Configuration,Six Sigma, Version Control and Change Control	4
10	**Emerging and advanced topics in Software Engineering**: Security Engineering, Agile Methods, Client Server Software Engineering, Aspect Oriented Software Development, Software Engineering Aspects of Programming Languages, Reverse Engineering, Re-engineering, Web Engineering	3

Learning Outcomes:

After completion of the course students will be able to

1. Prepare SRS (Software Requirement Specification) document and SPMP (Software Project Management Plan) document.
2. Apply the concept of Functional Oriented and Object Oriented Approach for Software Design.
3. Recognize how to ensure the quality of software product, different quality standards and software review techniques.
4. Apply various testing techniques and also upgrade it using advanced Software Engineering.

Teaching & Learning Methodology:

For teaching this subject power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work.

Books Recommended:

1. **Roger S. Pressman,** Software Engineering: A practitioner's approach, McGraw Hill.
2. **Rajib Mall,** Fundamentals of Software Engineering, Prentice Hall India.
3. **Pankaj Jalote,** An integrated approach to Software Engineering by Springer.
4. **Ian Sommerville,** Software Engineering, Addision and Wesley.

List of Open Source Software/Learning website:

1) Software:-Rational Rose, Microsoft Visio, Enterprise resource planning
2) Project Management Tools
3) SCM Tools
4) SQA Tools
5) Analysis and Design Tools
6) User Interface Development Tools
7) Object-Oriented Software Engineering Tools
8) Testing Tools
9) Formal Methods Tools
10) Client/Server Tools
11) Web Engineering Tools
12) Reengineering Tool

List of Experiments:

Prepare case study on Following:

1) Library Information System
2) Villager Telephone System
3) Waste Management Inspection Tracking System (WMITS)
4) Flight Control System
5) Ambulance Dispatching System
6) Development of requirements specification
7) Function oriented design using SA/SD
8) Object-oriented design using UML
9) Test case design
10) Implementation using Java and testing
11) Use of appropriate CASE tools and other tools such as configuration management tools
12) Program analysis tools in the software life cycle

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

.NET Technology

CODE: 23040605

B.E. 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	4	7	5	30	50	70	00	150

Objectives:

The course builds upon the procedural and object-oriented programming logic tools from earlier courses. This course covers C# development using Visual Studio .NET and focuses on C# syntax, logic constructs, application development using windows forms, and the object-oriented nature of the language. Through the experience of creating these programs and methods the student will learn the fundamentals of C# programming to solve problems in various domains.

Prerequisites:

Require basic Knowledge of HTML, CSS, JavaScript and Web servers.

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	**Introduction :** • What is .NET? • What is the CLR? • The FCL • Primitive Types • Namespaces • Statements and Expressions • Operators	06

2	**Classes and Objects:** • Constructors • Reference Types • Object Oriented Programming • Access Modifiers • Abstract Classes • Virtual Members • Static Classes • Debugging and Error Handling	04
3	**ADO.NET:** • Benefits of ADO.NET • ADO.NET compared to classic ADO • Datasets • Managed Providers • Data Binding: Introducing Data Source Controls • Reading and Write Data Using the Sql Data Source Control	04
4	**Windows Forms and Controls in details:** • The Windows Forms Model • Creating Windows Forms Windows Forms Properties and Events • Windows Form Controls, • Menus -Dialogs -ToolTips	05
5	**Visual Inheritance in C#.NET:** • Apply Inheritance techniques to Forms • Creating Base Forms • Programming Derived Forms	04
6	**Mastering Windows Forms:** • Printing - Handling Multiple Events • GDI+ • Creating Windows Forms Controls	04
7	**Themes and Master Pages:** • Creating a Consistent Web Site, • Themes - Master Pages • Displaying Data with the GridView Control Introducing the GridView Control • Filter Data in the GridView Control • Allow Users to Select from a DropDownList in the Grid • Add a Hyperlink to the Grid • Deleting a Row and Handling Errors	06
8	**Managing State:** • Preserving State in Web Applications and Page-Level State • Using Cookies to Preserve State • ASP.NET Session State • Storing Objects in Session State • Configuring Session State • Setting Up an Out-of-Process State Server • Storing Session State in SQL Server • Using Cookieless Session IDs • Application State Using the DataList and Repeater Controls • Overview of List-Bound Controls • Creating a Repeater Control and DataList Control	06

Learning Outcomes:

Knowledge Outcomes:

1. Articulate the basic syntax and features of the C# programming language
2. Define C# constructs which implement the three basic control structures
3. Define arithmetic, relational, and logical operators
4. Describe object-oriented (OO) concepts related to classes and objects
5. Describe the concepts behind sound user interface design
6. Describe the concepts behind variables, constants, and calculations

Skill Outcomes:

1. Demonstrate the ability to create Object-Oriented (OO) application programs
2. Demonstrate the ability to create appropriate classes and objects
3. Demonstrate the ability to create windows-based applications
4. Demonstrate the ability to create user interfaces including but not limited to various boxes, buttons, menus, dialog boxes

Teaching & Learning Methodology:

1 At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.

2 The course includes a laboratory, where students have an opportunity to build an application for the concepts being taught in lectures.

3 Experiments shall be performed in the laboratory related to course contents.

Books Recommended:

1. Christian Nagel, Professional C# .Net, Wrox Publication.
2. Matthew Macdonald and Robert Standefer, ASP.NET Complete Reference, TMH.
3. Vijay Mukhi, C# The Basics, BPB Publication .

E-Resources:

1. http://www.tarleton.edu/cis/studentresources.html
2. http://online.tarleton.edu/fac_dev/applications/student_blackboard/index.htm

Practical List:

Sr. No.	Practical
1	Write a program to check whether empty query string is entered in Asp .net
2	Write a program to change color of Label text control programmatically in Asp .Net
3	Write a program to Enable-Disable Textbox and change width of TextBox programmatically in Asp .Net
4	Write a program to increase and decrease font size programmatically.
5	Write C# code to display the asterisk pattern as shown below: ***** ***** ***** ***** *****
6	Write C# code to prompt a user to input his/her name and country name and then the output will be shown as an example below: Hello Ram from country India!
7	Write C# code to do the following - Convert binary to decimal - Convert decimal to hexadecimal - Convert decimal to binary - Convert decimal to octa
8	Write C# code to convert infix notation to postfix notation.
9	Write a C# code to convert digits to words
10	Write a C# code to Convert following currency conversion. Rupees to dollar, frank, euro.
11	Write a C# code to Perform Celsius to Fahrenheit Conversion and Fahrenheit to Celsius conversion.
12	Write ASP.Net program to Store Objects in Session State and Storing Session State in SQL Server.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

WIRELESS NETWORK

CODE : 2304601

DEGREE: 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	4	7	5	30	50	70	-	150

Objective:

Introduce students about planning and design of wireless networks and HSPA systems. To study emerging technologies like Bluetooth, Zigbee and Wimax. Understanding the wireless sensor network architecture and the protocol stack and WSN applications

Prerequisite:

Students need to understand the Computer Communication and Networks as well as Mobile Communication before learning this syllabus.

Course outline:

Sr.No.	Course Contents	Number of Hours
1	**INTRODUCTION:** Evolution of mobile communications, Mobile Radio System around the world, Types of Wireless communication System, Comparison of Common wireless system, Trend in Cellular radio and personal communication. Second generation Cellular Networks, Third Generation (3G) Wireless Networks , Wireless Local Loop(WLL),Wireless Local Area network(WLAN), Bluetooth and Personal Area Networks.	5
2	**TRANSMISSION FUNDAMENTALS**: Signals for Conveying Information, Analog and Digital Data Transmission, Channel Capacity, Transmission Media, Multiplexing.	7

	COMMUNICATION NETWORKS: LANs, MANs and WANs , Switching Techniques, Circuit Switching, Packet Switching **MODULATION TECHNIQUES:** Signal Encoding Criteria, Digital Data- Analog Signals, Analog Data-Analog Signals, Analog Data-Digital Signals **SPREAD SPRECTRUM:** The Concept of Spread Spectrum, Frequency Hopping Spread Spectrum, Direct Sequence Spread Spectrum, Code Division Multiple Access,	
3	**MULTIPLE ACCESS IN WIRELESS SYSTEM:** Multiple access scheme, frequency division multiple access, Time division multiple access, code division multiple access, space division multiple access, packet radio access, multiple access with collision avoidance.	7
4	**GLOBAL SYSTEMFOR MOBILE COMMUNICATION (GSM):** Global system for mobile communication, GSM architecture, GSM entities, call routing in GSM,PLMN interface, GSM addresses and identifiers, network aspects in GSM,GSM frequency allocation, authentication and security	7
5	**GENERAL PACKET RADIO SERVICE (GPRS):** GPRS and packet data network, GPRS network architecture, GPRS network operation, data services in GPRS, Applications of GPRS, Billing and charging in GPRS.	6
6	**BLUETOOTH:** Radio specification, baseband specification, link manager specification, logical link control and adaption protocol.	3
7	**ZigBee:** Components, architecture, network topologies, protocol stack .	3
8	**UWB and RFID:** Technical requirements, components and characteristics, applications. **WiMAX:** 802.16 based protocol architecture, physical layer, fixed and mobile WiMAX.	3

Learning Outcomes:

- Describe the phases of planning and design of mobile wireless networks.
- List and compare personal area network (PAN) technologies such as Zigbee, Bluetooth etc.
- Students will details of sensor network architecture, traffic related protocols, transmission technology etc.
- Knowledge about GSM and GPRS. (1G/2G and 2.5G technologies).

Teaching & Learning Methodology:

For understand this syllabus students need Amplitude, Phase and Frequency modulation kit and Advanced AM/FM signal generator. GSM and CDMA trainer kit will be used for practical.

Books Recommended:

1. Computer networks and internets- Douglas E Comer—Pearson –5th edition.
2. Internetworking with TCP/IP -- Douglas E Comer—Pearson –5th edition.
3. TCP/IP protocol suite- Behrouz Forouzen.
4. Wireless Communications & Networks, Second Edition, William Stallings by Pearson
5. Mobile ComputingTechnology, Applications and service creation, Asoke K Telukder, Roopa R Yavagal by TMH
6. Wireless and mobile networks, Dr. Sunilkumar S. Manvi, Dr. Mahabaleshwar S. Kakkasageri by WILEY

E-Resources:

https://www.tutorialspoint.com/gsm/gsm_architecture.htm
https://www.tutorialspoint.com/gprs/gprs_architecture.htm
https://www.techopedia.com/2/29090/networks/lanwanman-an-overview-of-network-types
http://www.swiftutors.com/bluetooth-introduction.html
https://www.elprocus.com/what-is-zigbee-technology-architecture-and-its-applications/

Practical List:

Sr. No.	Practical
1	Study practical of Wireless networks.
2	Prepare a wireless ad hoc network and show its working.
3	Study practical of GSM.
4	Study practical of GPRS.
5	Study practical for Bluetooth and ZigBee.
6	Write a program that identifies the bluetooth devices in the wireless range.
7	Write a program to perform Bluetooth file transfer.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

Data Center Management

CODE: _____

B.E. 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	4	7	5	30	50	70	-	150

Objectives: Main objectives are ability to mix and match technologies makes enterprises more agile, innovative and competitive. However, running disparate systems can lead to a number of security and business risks. It succeed, the project will require alignment of the business and technology goals, as well as buy-in from several areas.

Prerequisites: Knowledge of Operating Systems and Computer Networks

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	Basic Introduction of Data center Architecture, Requirement, Required Physical Area for Equipment and Unoccupied Space.	06
2	Required power to run all the devices, Required cooling and HVAC Required weight, Network Bandwidth.	05
3	Budget Constraints, Selecting a Geographic Location Safety from Natural hazards and manmade disaster.	05
4	Data Center design and planning and cabling.	04
5	Data Center Maintenance monitoring, Physical and logical security.	04
6	Data center Consolidation, Reasons for data center Consolidation, Consolidation opportunity, Server consolidation, Storage Consolidation, Network Consolidation, Service Consolidation, Process Consolidation, Staff Consolidation, Data Consolidation phases.	06
7	Data center servers, Sever Capacity Planning System Management Best Practices, Server Cluster Best Practices, Data Storage Best Practices.	05
8	Best Practices for System Administration, System Administration Work Automation.	04

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

Advance Java
CODE: 23040606
B.E. 6th SEMESTER

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	4	7	5	30	50	70	-	150

Objectives:

To understand basic web application using JAVA and how to develop an applications in advance java technology. It introduce to developing web applications, advanced Java fundamentals, like JSP, Servlets, JDBC etc. it has good exposure to the object-oriented programming (OOP) concepts of Java language.

Prerequisites:

Object Oriented Programming Concept, Knowledge of Logical Programming and Core JAVA

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	**Java Networking:** Network Basics and Socket overview, TCP/IP client sockets, URL, TCP/IP server sockets, Datagrams, java.net package Socket, Server Socket, Inet Address, URL, URL Connection.	10
2	**JDBC Programming:** The JDBC Connectivity Model, Database Programming: Connecting to the Database, Creating a SQL Query, Getting the Results, Updating Database Data, The Statement Interface, Prepared Statement, Callable Statement The ResultSet Interface.	10
3	**Servlet API and Overview Servlet Model:** Overview of Servlet, Servlet Life Cycle, HTTP Methods Structure and Deployment descriptor ServletContext and ServletConfig interface, Cookies and Session Management: Understanding state and session, Understanding	08

	Session Timeout and Session Tracking.	
4	Java Server Pages JSP Overview: The Problem with Servlets, Life Cycle of JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment	05
5	Java Server Faces2.0 Introduction to JSF, JSF request processing Life cycle, Overview of Hibernate, Hibernate Architecture, Overview of Spring.	06

Learning Outcomes:

After successful completion of the course students should be able to:

1. Use various tools, and Validation techniques, use of different templates available in IDEA, implementation and testing strategies in real time applications
2. Use advanced concepts related to Web Services, spring and Hibernate.
3. Create Java based Web Application
4. To get knowledge and apply of java based tools and technology in real world application.

Teaching & Learning Methodology:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Books Recommended:

1. Black Book "Java server programming" J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath"
2. Complete Reference J2EE by James Keogh McGraw publication.
3. Professional Java Server Programming by Subrahmanyam Allamaraju, Cedric Buest Wiley Publication.
4. Beginning JSP, JSF and Tomcat, Giulio Zambon, Apress.

E-Resources:

1. https://www.edureka.co/blog/advanced-java-tutorial
2. Software: JDK 8.0, Tomcat, MySQL
3. https://swayam.gov.in

Practical List:

Sr. No.	Practical
1	Create chat application using TCP and UDP Protocol.
2	Implement TCP Server for transferring files using Socket and Server Socket.
3	Implement any one sorting algorithm using TCP/UDP on Server application and Give Input On Client side and client should sorted output from server and display sorted on input side.
4	Implement Student information system using JDBC and RMI.
5	Create Servlet file which contains following functions: 1. Connect 2. Create Database 3. Create Table 4. Insert Records into respective table 5. Update records of particular table of database 6. Delete Records from table. 7. Delete table and also database
6	User can create a new database and also create new table under that database. Once database has been created then user can perform database operation by calling above functions. Use following Java Statement interface to implement program: 1. Statement 2. Prepared statement 3. Callable statement
7	Create database of student subject-wise data and retrieve all data using JSP and generate xml structure along with DTD and XML Schema definition
8	Create login form and perform state management using Cookies, Http Session and URL Rewriting.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

Data Compression and Transmission

CODE: 23080604

B.E.: 6th Semester

Teaching & Evaluation Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives:

The course provides an overview of classical and modern techniques and algorithms of various types of data compression. It covers statistical and dictionary methods, lossless and lossy compression algorithms in graphics, video and audio compression.

Prerequisites: Basic Knowledge of Computer Network and OSI Layer.

Course Outline:

Sr. No.	Course Contents	Number of Hours
1	**Introduction to Data Compression :** Compression Techniques: Lossless Compression, Lossy Compression, Measures of Performance Introduction.	02
2	**Mathematical Preliminaries for Lossless Compression Models :** Physical Models, Probability Models, Markov Models, Composite Source Model, Coding, Uniquely Decodable Codes, Prefix Codes, Algorithmic Information Theory, Minimum Description Length Principle.	05
3	**Huffman Coding :** The Huffman Coding Algorithm , Minimum Variance Huffman Codes, Adaptive Huffman Coding,Update Procedure, Encoding Procedure, Decoding Procedure, Golomb Codes, Rice codes, Tunstall Codes Applications of Huffman Coding, Lossless Image Compression, Text Compression, Audio Compression.	06

4	**Arithmetic Coding:** Introduction, Coding a Sequence, Generating a TagDeciphering the Tag ,Generating a Binary Code, Uniqueness and Efficiency of the Arithmetic Code Algorithm Implementation, Integer Implementation, Comparison of Huffman and Arithmetic Coding, Adaptive Arithmetic Coding.	06
5	**Dictionary Techniques :** Static Dictionary, Digram Coding, Adaptive Dictionary, LZ77 Approach LZ78 Approach, Applications, File Compression—UNIX compress Image Compression (Graphics Interchange Format (GIF),Portable Network Graphics (PNG)),Compression over Modems—V.42 bis.	07
6	**Predictive Coding :** Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, Length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Move-to-front coding Lossless Image Compression, CALIC, JPEG-LS, Multi-resolution Approaches Facsimile Encoding ,Dynamic Markov Compression.	07
7	**Digital Data Transmission:** Components of digital communication system, line coding, pulse shaping, Scrambling, Regenerative Repeater, Eye Diagram, Timing Extraction, Detection Error Probability, M-ary communication, Digital Carrier Systems.	06

Learning Outcomes:

After successful completion of this course, student will be able to

1. Understand and apply various coding techniques for compression.
2. Differentiate between Lossy and Lossless compression.
3. Understand basic concept of data transmission.

Teaching & Learning Methodology:

- At the start of course, the course delivery pattern of the subject will be discussed.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Books Recommended:

1. Introduction to Data Compression, Khalid Sayood, Morgan Kaufmann Publishers
2. The Data Compression book, Mark Nelson, Jean Loup Gaily
3. Data Compression : The Complete Reference", David Saloman, Springer
4. Modern Digital and Analog Communication Systems, B. P. Lathi, (3rd Edition), Oxford Publication
5. Principles of Communication Systems, Taub & Schilling, (2nd Edition), Tata McGraw Hill Publication

E-Resources:

1. http://nptel.ac.in
2. http://ocw.usu.edu/Electrical_and_Computer_Engineering/Information_Theory/
3. https://www.ics.uci.edu/~dan/pubs/DataCompression.html

Practical List:-

Sr. No.	Practical
1	Write a program that compresses and displays uncompressed windows BMP image file.
2	Write a program to generate binary code in case of arithmetic coding.
3	Implement Huffman Code (HC) to generate binary code when symbol and probabilities are given.
4	Implement Huffman code which can compress given file and decompress compressed file.
5	Implement adaptive Huffman program to compress decompressed file
6	Write a program to implement arithmetic compression.
7	Write a program to Implement LZ77 algorithm
8	Write a program to Implement LZ55 algorithm.
9	Write a program to Implement LZ78 algorithm
10	Write a program which performs JPEG compression, process step by step for given 8x8 block and decompression also.

SWARRNIM STARTUP AND INNOVATION UNIVERSITY

CHEMICAL ENGINEERING (05)

MASS TRANSFER OPERATION-1

SUBJECT CODE:

B.E. 5th SEMESTER

Type of course: Chemical Engineering

Prerequisite: None

Rationale:

The objective of this course is to study the principles of mass transfer and their application to separation and purification processes. The course integrates fluid dynamics and thermodynamics and proceeds to develop rate expressions for mass transfer in gases, liquids and solids

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks			Total Marks
				Theory Marks		Practical Marks	
L	T	P	C	ESE (E)	PA (M)	PA (I)	
3	0	2	4	70	30	50	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction:** Classification of mass transfer operation, choice of separation method, Methods of conducting mass transfer operations, Design principles	02	03
2	**Molecular Diffusion in Fluids:** Definition of molecular and eddy diffusion, Fick's first law, Concept of N & J Flux, Steady state molecular diffusion in fluids at rest and in laminar flow, concept of effective diffusivity. Diffusivity of gases, Diffusivity of liquids.	04	09
3	**Mass Transfer Coefficients:** Mass transfer in laminar and turbulent regions, F and k type mass transfer coefficients, Film, Penetration and surface renewal theories.	02	04
4	**Inter Phase Mass Transfer:** Concept of equilibrium, diffusion between phases, Two resistance theory, Local overall mass transfer coefficient, controlling mass transfer Resistances.	04	04

5	**Gas Absorption:** Equilibrium Solubility of gases in liquids, Ideal and non-ideal solution, Choice of solvent for absorption, Material balance and liquid-gas ratio for absorption and stripping, Counter current multi stage operation (isothermal), Absorption factor, Continuous contact equipment's, Overall coefficient and Transfer units, Concept of HETPand HTU, NTU and j_H factor, Industrial absorbers. Dilute solutions, Absorption with chemical reaction	08	08
6	**Equipment's for Gas Liquid Operations:** Gas Dispersed: Sparged vessels, Mechanically agitated vessels, Gas-Liquid contact, Tray Tower, Tray tower internals, Different types of trays, Weirs, Down comers and criteria of their selection, Flooding, Loading, Coning, Weeping & dumping in tray tower; Liquid Dispersed: Ventury scrubber, Wetted wall towers, spray towers, Packed Towers, Packedtowerinternals,Differenttypesofpackingsandtheirselection Criteria, mass transfer coefficient for packed towers, Co-current flow of gas & liquid, End effects and axial mixing, Tray tower vs. Packed tower.	08	08
7	**Liquid-Liquid Extraction:** Ternary liquid- liquid equilibrium and tie line data, system of three liquids-one pair partially soluble, system of two partially soluble liquids-one solid, multi-component system, stage wise contact, Single stage & multistage extraction, Co-current and cross current extraction, Continuous counter current multistage extraction with and without reflux, Theory & performance of continuous contactequipment's, Single stage & multistage equipment's, Applications of liquid-liquid extraction.	07	06
8	**Leaching:** Steady state and unsteady state leaching operations, Single stage leaching, Multistage cross current and counter current leaching, Rate of leaching,Recoveryofsolventvapors,Applicationofleaching,Leaching equipments	04	04

Reference Books:

1. "Mass transfer operation" by R.E.Treybal,Mc-Graw Hill international, 3rd edition
2. "Mass Transfer"bySherwood,Pigford&Wilke,Mc-GrawHillinternational.
3. "ChemicalEngineering",Volume-2,byCoulson&Richardson,4th edition
4. Perry's Chemical Engineers handbook,byPerry&Green,Mc-Graw.Hill international, 7th edition
5. UnitOperationsofChemicalEngg.ByW.L.McCabe,J.C.Smith&Harriott,Mc-GrawHillinternational, 6th edition

Course Outcome:

After learning the course the students should be able to:

1. To build a basic knowledge of mass transfer operations and separation processes carried out in chemicalindustries.
2. To understand the designing of mass transfer equipments used in the chemical industries.
3. To utilize the technological methods in problem solving of mass transfer operations inindustries.
4. To review the practical importance and relevance of mass transfer in chemicalindustry.
5. To understand the applications of different mass transferprocesses.
6. To recognize the selection criteria for mass transfer process and equipments required by the industries.

List of Experiments:

Minimum **5** practical's to be performed and remaining time should be allotted to open-endedprojects/study reports/latest outcomes intechnologystudy:-

1. In the beginning of the academic term, faculties will have to all their students at least one Open-ended Project / Study Report /Latest outcome in technology.
2. Literature survey including patents and research papers of fundamental process
- Design based small project**or**
- Study report based on latest scientific development **or**
- Technology study report/modeling/ simulation/collection report **or**
- Computer based simulation/web based application/analysis presentation sofbasic concept field

which may help them in chemical engineering.

3. These can be done in a group containing maximum **three** students in each.
4. Faculties should cultivate problem based project to enhance the basic mental and technical level of students.
5. Evaluation should be done on **approach of the student on his/her efforts** (not on completion) to study the design module of given task.
6. In the semester student should perform **minimum** 5 set of experiments and complete **one small open ended dedicated project** based on engineering applications. This project alongwith any performedexperiment should be **EVALUATED BY EXTERNAL EXAMINER.**

PRACTICALS (ANY FIVE):

1.	To determine the percentage extraction for the benzoic acid from dilute aqueous solution using toluene as solvent.
2.	To determine the diffusion co-efficient of CCl_4 in air & variation with temperature.
3	Determine mass transfer co-efficient of liquid (water) evaporation to atmospheric air at elevated temperature.
4.	To determine the efficiency of single stage leaching operation for leaching of NaOH aqueous solution &$CaCO_3$.
5.	To find out the liquid side mass transfer coefficient K_{La} for the absorption of CO_2 in NaOH in the packed column.
6.	To prepare the ternary diagram for a system of three liquid one pair partially soluble i.e. acetic acid, benzene and water system.

7.	To study the (cross current) liquid-liquid extraction for extracting acetic acid from benzene using water as solvent.
8.	To determine the mass transfer coefficient in a stirred cell.
9.	To carry out crystallization with & without seeding
10.	To determine the stage efficiency and the overall recovery of NaOH for multistage cross current leaching operation for leaching NaOH from mixture of NaOH and $CaCO_3$ using water as a solvent.

Design based Problems (DP)/Open Ended Problem:

Students are free to select any area of science and technology based on chemical engineering applications to define Projects.

Some suggested project short listed below:

- Absorptionoftwocompoundsbyusingpackedcolumn
- To carry out crystallization by usingcrystallizer
- Separation of compounds using Liquid-liquid extraction andleaching.

Major Equipment:

Packed column, Stirred cell, crystallizer, and Diffusion apparatus.

List of Open Source Software/learning website:

1) Literature available in any laboratory manual of Mass TransferOperation-I.
2) Mass Transfer Operations for the Practicing Engineer by Louis Theodore, Francesco Ricci, Wiley Publishers
3) NPTEL
4) Website: academia.edu for Laboratory view based e-learning portal for virtual mass transfer operationslaboratory

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide.

SWARNIM STARTUP AND INNOVATION UNIVERSITY

CHEMICAL ENGINEERING (05)

MECHANICAL OPERATION
SUBJECT CODE:
B.E. 5th SEMESTER

Type of course: Chemical Engineering.

Prerequisite: Heat, Mass and Momentum transfer

Rationale: The main objective of this subject is to study the basic mechanical operation (crushing, grinding, screening, filtration, etc.) takes place during the process in chemical industry. It also provides platform to study and analyze various properties associated with the solid when it is in flow condition. This subject provides the fundamental knowledge regarding to particle size reduction and enlargement by various methods and also deals with the detail construction & working of equipment's used for mechanical operations.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks			Total Marks
				Theory Marks		Practical Marks	
L	T	P	C	ESE (E)	PA (M)	PA (I)	
3	0	2	4	70	30	50	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Solids and Its Flow Properties:** Characterization of solid particles, Mixed particles sizes and analysis, Screen analysis, properties of particulate masses, Mixing of solids, Mixer for cohesive solids, Mixer for free flowing solids.	08	07
2	**Size Reduction, Enlargement, Screening:** Principles of comminution, Rittinger's and kick's laws, Bond's crushing law and work index, Size reduction equipments, crushers, grinders, Ultra-fine grinders, Cutting machines, Open circuit and closed circuit operation, Screening equipment, Comparison of ideal and actual screens, Screen Effectiveness.	12	11
3	**Fluidization and Conveying:** Conditions for Fluidization, Types of fluidization, Applications of Fluidization, Slurry and pneumatic transport, Conveyers.	10	09
4	**Filtration and Sedimentation :** Introduction, Cake filters, Filter press, Shell and leaf filters, Discontinuous vacuum filters, Continuous vacuum filters, Centrifugal filters, Filter media, Filter aids, Principles of cake filtration, Clarifying filters, Gravity classifiers, Sink and float method, Differential settling methods, Clarifiers and thickeners, Batch sedimentation, Rate of sedimentation, Thickeners, Sedimentation zones in continuous thickeners, Cyclones, Hydrocyclones, Cenrifuges.	15	15

5	**Mixing and Agitation:** Differenttypesofagitatorsandtheirselectioncriteria,Calculationofpower requiredforagitation,Scaleupofagitatedvessel,Staticmixers.	09	08

Reference Books:

1. Foust A. S. & associates, "Principles of Unit Operations" John Wiley and Sons(1980).
2. McCabe Smith, "Unit Operation in Chemical Engineering" 5th ed. McGraw Hill(1985).
3. Perry R.H. & Chilton C.H., "Chemical Engineers Hand Book", 7th ed. McGrawhill.
4. Badger and Bencharo, "Introduction to Chemical Engineering". Tata McGrawhill.
5. S. K. Gupta, "Momentum Transfer Operation". Tata McGraw Hill(1979)
6. Davidson J.F. &Harrison D."Fluidization" Academic press(1985)
7. Kunni&Levenspiel "Fluidization engineering "Wiley (1962) 8. Brown, G.G. and associates "Unit operations" Wiley, New York,(1950).
8. Coulson and Richardson: Chemical Engineering, Vol. 2.Butterworth HeinemannPub
9. Welty, Wicks, Wilson &Rorrer, Fundamentals of Momentum, Heat and Mass Transfer, 4th ed. Wiley Narayanan C.M.& Bhattacharya B.C. "Mechanical Operations for Chemical engineers", Khanna Publishers. 3 rdEd.1999

Course Outcome:

After learning the course the students should be able to:

1. To build basic knowledge of various mechanicaloperations.
2. Toreviewthepracticalimportanceandrelevanceofunitoperationsusedforcrushing,grindingand size separation in chemicalindustry.
3. To utilize the technological methods related to unit operations in processplant.
4. To study a detailed overview of equipment used to perform various mechanical operations and problems associated during the implementation andapplications.
5. To build a bridge between theoretical and practical concept used inindustry

List of Experiments and Open Ended Projects:

Minimum **5** practical's to be performed and remaining time should be allotted to open-ended projects / study reports / latest outcomes in technology study:-

1. In the beginning of the academic term, faculties will have to allot their students at least one Open-ended Project / Study Report / Latest outcome in technology.

2. Literature survey including patents and research papers of fundamentalprocess
- Design based small projector
- Study report based on latest scientific developmentor
- Technology study report/ modeling/ simulation/collection reportor
- Computer based simulation/ web based application/ analysis presentations of basic concept field which may help them in chemicalengineering.

3. These can be done in a group containing maximum **three** students ineach.
4. Faculties should cultivate problem based project to enhance the basic mental and technical level of students.
5. Evaluation should be done on approach **of the student on his/her efforts** (not on completion) to study the design module of giventask.
6. In the semester student should perform **minimum** 5 set of experiments and complete **one small open ended dedicated project**based on engineering applications. This project along with any performed experiment should be **EVALUATED BY EXTERNALEXAMINER.**

PRACTICALS (ANY FIVE):

Sr. No.	List of experiments
1.	To carry out the batch sedimentation tests.
2.	To study the effect of forth flotation in the recovery of given sample from the solution.
3	To calculate the overall efficiency of the cyclone separator.
4.	To find mixing index.
5.	To determine Critical index, Work Index, Bond's Law, Rittinger's Law and Kick's Law for Ball mill.
6.	To determine the screen efficiency for the given sample.
7.	To determine Rittinger's constant, Bond's constant, Kick's constant and Work Index.
8.	Todeterminenipangle,ReductionRatio,RibbonFactor,Rittinger'sconstant,Bond'sconstant, Kick's constant , Work Index as well as Theoretical & ActualCapacity.
9.	To Study how the power consumption of an agitator changes with Reynolds and Froude numbers.
10.	To study the Filter Press.

Design based Problems (DP)/Open Ended Problem:

Students are free to select any area of science and technology based on chemical engineering applications to define Projects.

Some suggested projects are listed below:

- Preparationofworking/non-workingmodelsoffiltrationequipment's,mixing/agitationtanks,grinding / crushing unit and its industrial importance.
- Practical importance of various and various analogies associated withit.

Major Equipment:

Jaw crusher, Gyratory crusher, Roll crusher, Ball mill, Cyclone separator, Plate & Frame filter, Filter press, Sieve shaker apparatus etc.

List of Open Source Software/learning website:

1) Literature available in any laboratory manual of MechanicalOperation.
2) NPTEL
3) MITOpen course lecture available on Internet etc...

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide.

SWARNIM STARTUP AND INNOVATION UNIVERSITY

CHEMICAL ENGINEERING (05)

CHEMICAL ENGINEERING THERMODYNAMICS – II

SUBJECT CODE:

B.E. 5th SEMESTER

Type of course: Chemical Engineering

Prerequisite: Chemical Engineering Thermodynamics- I

Rationale: This course introduces the basic thermodynamics concepts of multiphase equilibrium in pure and multi-component systems. Starting with ideal gas mixtures and ideal solutions, the concepts of bubble and dew points are introduced to enable flash calculations and design of process components. Subsequently, various levels of non-ideality and complexity are introduced: 1) activity coefficient models for non-ideal liquid mixtures, 2) fugacity calculations of gas and liquid phases from equations-of-state, 3) systems with chemical reactions. The course provides fundamental insight into the underlying thermodynamic principles, as well as practice with advanced computational techniques to solve complex problems.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks			Total Marks
				Theory Marks		Practical Marks	
L	T	P	C	ESE (E)	PA (M)	PA (I)	
3	1	0	3.5	70	30	50	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Vapour/Liquid Equilibrium (VLE): Introduction The Nature of Equilibrium, the Phase Rule, Duhem's Theorem, VLE-Qualitative Behaviour, Azeotropic Mixtures, Maximum Boiling Azeotrope, Minimum Boiling Azeotrope, Simple Models for Vapour/Liquid Equilibrium ,Raoult's Law, Dewpoint and BubblepointCalucations with Raoult's Law ,VLE by Modified Raoult'sLaw,VLE from K, Value Correlations, Flash Calculations	09	11
2	Solution Thermodynamics: Theory Fundamental Property Relation, The Chemical Potential as a Criterion for Phase Equilibria, Partial Properties, Equations Relating Molar and Partial Molar Properties , The Partial Molar Gibbs Energy and the Generalized Gibbs-Duhem Equation, Partial Properties in Binary Solutions, Relations amongPartialProperties,TheIdealGasMixture,ThePartialMolarGibbs Energy and Fugacity, Fugacity and Fugacity Coefficient: Pure Species, FugacityandFugacityCoefficient:SpeciesinSolution,TheIdealSolution Model,TheLewis/RandallRule,ExcessProperties,TheExcessGibbs Energy and the Activity Coefficient, Nature of Excess Property	10	11

3	Solution Thermodynamics: Applications Liquid-Phase Properties from VLE Data ,, Excess Gibbs	09	11
	Energy, Thermodynamic Consistency, Models for the Excess Gibbs Energy, Margules Equations, VanLaar Equations, Local Composition Models, NRTL Equation, UNIQUAC Equation,UNIFAC Method, Enthalpy/ Concentration Diagrams		
4	Chemical Reaction Equilibria: The reaction coordinates, Application of the criteria for equilibrium to chemical reactions, the standard Gibbs free energy change and the equilibrium constant, effect temperature on equilibrium constant, evaluationoftheequilibriumconstant,Relationofequilibriumconstantto composition, calculation of equilibrium conversion for single reaction, The phase rule and Duhem's theorem for reacting systems	11	11
5	Phase Equilibria: The Gamma / Phi Formulation of VLE, Equilibrium and stability, liquid-liquid equilibrium, solid- liquid equilibrium, osmotic equilibrium and osmotic pressure	4	06

Reference Books:

1. SmithJ.M,VanNessH.C.,AbbottM.M,"IntroductiontoChemicalEngineeringThermodynamics", the McGraw Hill Companies, Inc., USA, 7th Ed.,2005.
2. Elliot J. R. and Lira C.T., "Introductory Chemical Engineering Thermodynamics", Prentice Hall, 1999.
3. Hougen O.A., Watson K.M., and Ragatz R.A., "Chemical Process Principles Part,II" Thermodynamics, John Wiley1970.
4. Perry's chemical engineers handbook, 7th edition, McGraw,Hill, USA,2000.
5. K.V.Narayanan "A Text book of chemical Engineering thermodynamics", Prentice Hall ofIndia
6. Stanley I. Sandler, "Chemical, Biochemical and Engineering Thermodynamics",Wiley India Pvt. Ltd., 4th ed.,2007.
7. B.G. Kyle,"Chemical Process Thermodynamics", 2nd Edn., Prentice Hall of India Pvt.Ltd., New Delhi,2000.
8. J.M.Prausnitz, R.N. Litchtenthaler, Molecular thermodynamics of fluid phase Equilibria, 3rdEdition,PrenticeHall.
9. Stanley M. Walas, Phase-Equilibria in Chemical Engineering,Wiley India PrivateLimited

Course Outcome:

After learning the course the students should be able to:

1. Solutionthermodynamicsfundamentals.ApplicationofRaoult'slawanditsvariationtoobtainVLE for binary systems.
2. Understand partial molar properties of components in a particular phase, and apply to calculations of heat of mixing, volume, and entropy changes on processing of ideal and realmixtures.
3. Azeotrope and itsimportance.
4. Estimating thermodynamic properties like fugacity, activity from the network ofequations.
5. Solution Thermodynamics calculating the thermodynamic properties from experimental data. Different Activity coefficientmodels.
6. Data reduction to get constants of different activity coefficientmodels.
7. Predict the equilibrium products and their concentration in equilibrium when dealing with systems involvingchemicalreactions.ThetopicwillincludeHomogeneousandHeterogeneousreaction.You will also get an introductory knowledge of multi reactionequilibrium.

List of Open Source Software/learning website:

1. Students can refer to video lectures available on the websites including NPTEL lectureseries.
2. StudentscanrefertotheCDsavailablewithsomereferencebooksforthesolutionofproblemsusing software/spreadsheets. Students can develop their own programs/spreadsheets for the solution of problems.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide.

SWARNIM STARTUP AND INNOVATION UNIVERSITY

CHEMICAL ENGINEERING (05)

INSTRUMENTATION & PROCESS CONTROL

SUBJECT CODE:

B.E. 5th SEMESTER

Type of course: BE

Prerequisite: Basics of differential equations, material and energy balance.

Rationale: This course introduces dynamic processes and the engineering tasks of process operations and control. Subject covers modeling the static and dynamic behavior of processes; control strategies; design of feedback, feed forward, and other control structures; and applications to process equipment.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks			Total Marks
				Theory Marks		Practical Marks	
L	T	P	C	ESE (E)	PA (M)	PA (I)	
3	0	2	4	70	30	50	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction of Process Control:** Steady state system, Process control, Feedback control, Transient response, Proportional control, Integral control, Block diagram, Parts of control system.	1	02
2	**Laplace Transforms:** Definition, Transforms of simple functions, Ramp functions,Sinefunctions,Solutionsofdifferentialequations.Inversionsof transform function by partial fractions, qualitative nature of solutions, Final value and initial value theorem S.	5	03
3	**Response of First Order Systems:** Mercury thermometer, Transient response of step functions, Sinusoidal input, Impulse functions. Physical Examples of First Order Systems: Liquid level, Mixing process, RC circuit,linearization.FirstOrderSysteminSeries:Non-interactingsystem ofliquidlevel,Generalizationofseveralnon-interactingsystemsinseries, Interactingsystems.	6	06
4	**Second Order Systems:** Development of transfer functions,Damped vibrator, Liquid manometer, Thermometer in thermo pocket, Step response&impulseresponseforζ<1,ζ>1&ζ=1,Overshoot,Decayratio,	4	04

	Rise time, Response time, Period of oscillation, Natural period of oscillation, Sinusoidal response, Transportation lag.		
5	**The Control Systems:** Block diagram, Negative and positive feedback, Servo problem v/s regulator problems, Development of block diagrams, Process measuring element, Controller, Final control element. Closed Loop Transfer Functions: Standard block diagram symbols, Overall transfer function for single loop system, Overall transfer function for change in load, Overall transfer function for multi loop control system.	**6**	**05**
6	**Controllers and Final Control Elements:** Actual v/s Ideal controller, Pneumatic controller mechanism of proportional control, Proportional integral (PI) control, Proportional derivative (PD) control, Proportional integral derivative (PID) control. Control valve, Control valve characteristics.	**2**	**02**
7	**Transient Response of Simple Control Systems:** Proportional control forSetpointchange(ServoProblem),Proportionalcontrolforloadchange (Regulator Problem), Proportional integral control for load change, Proportional Integral control for set point change, Proportional controlfor system with measurementlag.	**3**	**03**
8	**Stability:** Concept of stability, Definition of stability (linear system), Stability criterion, Characteristic equation, Routh test for stability, Routh array, Method of Root Locus for stability analysis, Nyquist stability criterion.	**6**	**04**
9	**Frequency Response analysis:** Fortunate circumstances, Transportation lag, Bode diagrams, First order system, First order system in series, Graphical rules for Bode diagrams.	**4**	**04**
10	**P & I Diagrams (Piping & Instrumentation diagram):** Symbols, P&I Diagramofreactors,Distillationcolumn,Shell&tubeheatexchanger,etc.	**1**	**02**
11	**Introduction of Process Measurement:** Elements of instruments, Parts of instruments, Static and dynamic characteristics.	**1**	**02**
12	**Temperature Measurement:** Scales, Expansion thermometers like constant volume gas, Mercury in glass, Bimetallic, Filled system thermometer like pressure spring thermometer, Static accuracy of thermometer, Dip effect in thermometer, Errors in thermometer of liquid and gas filled type like cross ambient effect, Head effect, Methods of compensation, Thermoelectric temperature measurement: Thermo couples, Laws of thermo electricity, Pyrometers: Laws of radiation,	**4**	**04**

	Radiation pyrometer, Photo electric pyrometers, Optical pyrometers, Errors in optical pyrometers.		
13	**Pressure Measurement:** Liquid column manometer, Enlarged lag manometer, Inclined tube manometer, Ring manometer, Tilting U tube manometer,Bourdongauge,Bellows,Bellowsdifferentialpressuregauge	3	03
14	**Liquid Level Measurement:** Direct measurement, Float and tap, Float and shaft, Hydraulic remote transmission, Bubbler system, Diaphragm & air trap system, Differential pressure manometer, Float and spring pneumatic balance, Displacement float, Magnetic float gauge.	3	03
15	**FlowMeasurement:** Head flow meter, Orificeplate ,Flownozzle, Venturi tube,pitottube,Differentialpressuremeter,Electrictypeheadflowmeter, Bellows type meter, Rotameter, Piston type area meter, Positive displacement meter.	3	03

Reference Books:

1. "Process System Analysis & Control", Coughanower and Kappel, Mc-Graw Hill BookCompany.
2. "Process Control and Instrumentation", R. P. Vyas, Denett&Co.
3. "Chemical Process Control", George Stephanopoulos, Prentice-HallIndia
4. "Industrial Instrumentation", Donald .P. Eckman, John Wiley & Sons Inc, NewYork.
5. "Industrial Instrumentation & Control", S. K. Singh, Tata McGraw-HillEducation.
6. "Process Instrumentation And Control", A. P. Kulkarni, NiraliPrakashan

Course Outcome:

After learning the course the students should be able to:

1. Understand concepts of process dynamics and various forms of mathematical models to express them, including differential equations, Laplace transfer functions, and frequency responseplots.
2. Develop mathematical models of chemical and processes by writing unsteady-state mass andenergy balances.
3. Analyze, design and tune feedback / feed forward controllers in the context of various control strategies used to control chemical and biologicalprocesses.
4. Recognize and fit various simple empirical models that are used for designingcontrollers.
5. Understand and design basic controlstrategies.

List of Experiments:

Experiments based on above topics.

Design based Problems (DP)/Open Ended Problem:

- Non working models of control systems for exemplary chemical processes
- Projects based on advanced controlstrategies
- Mathematical models of simple physicalsystems
- Studies related to modern hardware and instrumentation needed to implement process control.

Major Equipment:

- Interacting and non interacting liquid leveltanks
- Equipment for non linearprocess
- Temperaturetrainer
- Pneumatic control valve,etc

List of Open Source Software/learning website:

- NPTEL lectureseries
- Literature available on Instrumentation & ProcessControl
- MIT Open course lecture on Instrumentation & ProcessControl

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide.

SWARNIM STARTUP AND INNOVATION UNIVERSITY

B. E. SEMESTER: V

CHEMICAL ENGINEERING

Subject Name: **Fundamentals of Chemical Engineering Unit Operations**

SubjectCode:

Teaching Scheme			Credits	Examination Marks			Total Marks
				Theory Marks		Practical Marks	
L	T	P	C	ESE (E)	PA (M)	PA (I)	
3	0	2	4	70	30	50	150

Sr. No.	Course content
1.	**Introduction:** Definition & types of Unit operations.
2.	**Fluid Flow Operation:** Types of fluids, Continuity equation, Bernoulli's equation, Various types of Pumps, Flow meters & valves, Piping.
3.	**Mechanical Operation:** Size reduction equipment's, Filters, Centrifuges, Cyclones, Thickeners.
4.	**Heat Transfer Operation:** Mode of heat transfer, Definition of conduction, Convection & radiation, Condensation & boiling, Shell & tube heat exchanger &Evaporators.
5.	**Mass Transfer Operations:** Introduction of mass transfer operations like distillation, Extraction, absorption, Drying, Humidification, Crystallization, Mass transfer equipments like cooling towers, Tray drier and distillationcolumn.

Practical and Term Work:

Experiments based on the above topics for the testing & identification should be given to the students.

Reference Books:

1. Unit Operations of Chemical Engg. By W.L. McCabe, J. C. Smith &Harriott, 6th Edition Mc-Graw HillInternational.
2. "Chemical Engineering", Volume-1 & 2, 4th edition by Coulson &Richardson.
3. Unit Operation by Brown &Associates.
4. Perry's Chemical Engineers handbook, 7th edition by Perry & Green, Mc-Graw Hill international.

SWARNIM STARTUP AND INNOVATION UNIVERSITY

B. E. SEMESTER: VI

Chemical Engineering

Subject Name: **Mass Transfer Operation-II**

SubjectCode:

Teaching Scheme			Credits	Examination Marks			Total Marks
				Theory Marks		Practical Marks	
L	T	P	C	ESE (E)	PA (M)	PA (I)	
3	0	2	4	70	30	50	150

Sr. No	Course Content	Total Hrs.
1.	**Distillation:** Binary System: Introduction, Vapor-liquid Equilibria, *P-x-y T-x-y*diagrams, concept of volatility and effect of P and T on equilibrium data, Ideal solutions, Raoult's Law as applied to distillation operations, Deviation from ideality, Minimum and maximum boiling azeotropic mixtures, Enthalpy-concentration diagrams, their characteristics. Flash distillation, steam distillation, simple distillation, continuous rectification, Batch fractionation etc., Determination of number of stages by Ponchon and Severit method and McCabe-Thiele method, Concept of minimum, total and optimum reflux ratio, Reboilers, Use of open steam, , Partial condensers, cold hot circulating reflux etc.AzeotropicDistillation, ExtractiveDistillation	20
2.	**Humidification and dehumidification:** Vapor liquid Equilibrium, Enthalpy of saturated and unsaturated vapor liquid mixtures, adiabatic saturation curves, concept of wet bulb and dry bulb temp. Lewis relation, water-cooling with air, Dehumidification of air-water vapor, Various types of cooling tower & their selection criteria,wet bulb approach & range of cooling tower, Cooling tower fillings, Calculations of make-up water requirement of cooling tower.	10
3.	**Adsorption and ion exchange:** Types of adsorption, Nature of adsorbents, adsorption Equilibrium, adsorption of single gas/vapour from gaseous mixture, dilute and concentrated liquid solutions, fixed bed, ion-bed absorbers, and principles of ion exchange. Equilibria and rate of ionexchange.	06

4.	**Drying**: Drying operations and equipment's Mechanism of various drying operations, Batch& continuous drying equipment's-Tray dryer, Tunnel dryer, Rotary dryers, Spray dryers, Fluidized bed dryer,etc.	03

Practical and Term-work:

Experiments based on the above topics

Text Book:

"Mass transfer operation"byR.E.Treybal, Mc-Graw Hill international

ReferenceBooks:

1 "Mass Transfer" by Sherwood,Pigford&Wilke, Mc-Graw Hill international
2 "Chemical Engineering",Volume-2 ,4th edition by Coulson &Richardson
3 Perry's Chemical Engineers handbook,7th edition by Perry & Green, Mc-Graw Hill international
4 Unit Operations of Chemical Engg. By W.L. McCabe , J. C. Smith & Harriott,6th edition Mc-Graw Hill international

SWARNIM STARTUP AND INNOVTION UNIVERSITY

CHEMICAL ENGINEERING (05)

PROCESS EQUIPMENT DESIGN-I
SUBJECT CODE:
B.E. 6thSEMESTER

Type of course: Chemical Engineering

Prerequisite: The student should have basic understanding of Unit Operations of Chemical Engineering.

Rationale: Equipment design involves modifications and additions to existing plants or creating design layouts of plant / equipment's. With rapid rate of increase in the advancement of knowledge, it is important that the students should know the relevant application for equipment design. It has been observed conclusively that practice in using the reference literature and software has helped the students to secure jobs and also to perform better inprofession.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks			Total Marks
				Theory Marks		Practical Marks	
L	T	P	C	ESE (E)	PA (M)	PA (I)	
3	0	2	4	70	30	50	150

Content:

Sr. No.	Content	Total Hrs	%Weightage
1	**Process design of piping, Fluid moving devices and Flow meters**: Introduction, Process design of piping, $NPSH_A$ & $NPSH_R$, Power required by pump, evaluation of Centrifugal pump performance when handling viscous liquids, Power required in Fan, Blower and adiabatic compressor, flow meters, Process design of Orifice meter, Rotametheretc	08	14
2	**Process design of Heat exchangers**: Shell & Tube heat exchangers, Functions of various parts of shell & Tube Heat exchanger, General design method of shell & tube heat exchanger, Criteria of selection among Fixed Tube sheet, U Tube & Floating Head heat exchanger, Process design of without phase change heat exchanger, Process design of condenser, Criteria of selection for Horizontal and vertical condenser,	14	27
3	**Process design of Distillation Column:** Introduction, Criteria of selection, Selection of equipment for distillation, Distillation column design, Selection of key components for multi-component distillation, Determination of operating pressure for distillation column, Advantages & disadvantages of vacuum distillation, Determination of nos. of theoretical stages for binary distillation by McCabe Thiele method Determination of nos. of theoretical stages for multi-component distillation by Fenskey- Underwood-Gilliland'smethod, Selectionoftrays,Calculationsfortowerdiameter& pressuredropof	14	25

	sieve tray tower, Checking of conditions for weeping, down comer flooding, liquid entrainment, etc, tray efficiency, Jet Flooding & down comer Flooding, Different types of weirs & down comers of tray tower, their selection criteria,		
4	**Process design of Absorbers**: Introduction, Criteria for selection among different types of absorption equipment, Process Design of packed tower type absorber: Determination of actual amount of solvent, Selection of packing, Determination of tower diameter & pressure drop, Process design of Spray chamber or Spray tower type absorber, Venturi Scrubber.	10	17
5	**Process design of Extractor**: Industrial applications of liquid-liquid extraction, choice of solvent, Process design of counter current multistage extractor, Selection criteria among different types of extractor, Process design of mixer-settler type extractor & packed tower type extractor, Guidelines for the design of other types of extractors	08	17

Reference Books:

1. Ray Sinnott, Gavin Towler, Chemical Engineering Design - Principles, Practice and Economics of Plant and Process Design, Butterworth - Heinemann,2008.
2. Introduction to Process Engineering and Design by S B Thakore and B I Bhatt, Tata McGraw Hill, 1st Edition,2007.
3. Brownell and Young, Process Vessel Design, Wiley Eastern,1977.
4. M. S. Peters and K. D. Timmerhaus, Plant Design and Economics for ChemicalEngineers, 4th ed., McGraw - Hill, New York,1991.
5. Ludwig, E. E., Applied process design for chemical and petrochemical plants , volume 1,2 & 3, Third Edition, Butterworth-Heinemam,1997
6. TEMAStandards.
7. Don W. Green, Robert H. Perry, Perry's Chemical Engineers' Handbook, 8th Edn., McGraw -Hill, New York,2008
8. James R. Couper, James R. Fair & W. Roy Penney, Chemical Process Equipment - Selection and Design, 2 nd Edn., Butterworth - Heinemann,2010.

Course Outcome:

After learning the course the students should be able to:

1. Design process equipment and modify the design of existing equipment to new process conditions or new requiredcapacity.
2. Build a bridge between theoretical and practical concepts used for designing the equipment in any processindustry.
3. Create understanding of equipmentdesign.
4. Review the importance of design concepts in processindustry.

List of Experiments:

1. Prediction of Physicalproperties
2. Estimation of various design parameters for variousequipments.
3. Solution of various problem used in the designing ofequipments.

Design based Problems (DP)/Open Ended Problem:

Students are free to select any area for designing of equipment based on Chemical engineering applications to define Projects. Some suggested projects are listed below:

- Carry out design of plate / packed typeabsorber.

- Calculation related to the designing of distillation & extractioncolumn.
- Design of fluid moving machinery (viz. centrifugalpump).
- Project on pipingdesign.
- Design Calculation related to heat exchange equipment and their performancecriteria.

List of Open Source Software/learning website:

- Students can refer to video lectures available on the websites including NPTEL lectureseries.
- Students can refer to the CDs available with some reference books for the solution of problems using software/spreadsheets. Students can develop their own programs/spreadsheets for the solution ofproblems.
- MIT Open course lecture on Equipmentdesign.
- Literature available for Process design of equipment in plant /industry.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.

SWARNIM STARTUP AND INNOVATION UNIVERSITY
B. E. SEMESTER: VI
Chemical Engineering

Subject Name: **Pollution Control & Safety Management**
SubjectCode:

Teaching Scheme			Credits	Examination Marks			Total Marks
				Theory Marks		Practical Marks	
L	T	P	C	ESE (E)	PA (M)	PA (I)	
3	0	0	3	70	30	00	100

Sr. No	Course Content	Total Hrs.
a.	**Environmental Protection:** Concept of environment and ecology, various natural cycles in environment and ecology, effect of human activities on environment and ecology. Various types of environmental pollution in general and in chemical and allied industry in particular, sources and causes of environmental pollution, air pollution and its control, water pollution and its control, solid waste and its control, environmental impact assessment and EIS, methodologies for environmental pollution prevention (including process technology up gradation, development, Invention.), Rules, regulations, laws. regarding environmental protection, pollution prevention and control, waste disposal etc. Role of government, semi/quasi govt. and voluntary organizations. Recent trends and topics.	17
b.	Introduction to Industrial laws, Industries Factory act, Energy audit, water audit, Environment Audit, Trade union, Labour laws and acts. Industrial Electricity rules, Industrial Dispute Acts, Workmen compensation Act, ESIC Act, Payment and Wages act, Minimum Wages act, Payment of Bonus act, Recent trends and practices in Safe industrial practices	9
c.	**Safety Management:** Current practices and topics in safety management, rules, regulations, laws etc. for safety management in industry. 1. General Introduction Historical Background, Grown of Safety Science, Aims of Safety Science, Safety and the Organization. 2. Basic Concepts of Safety Science. Hazard, Risk, Nature of the accident process, Use of Engineering Fundamentals in safety science. 3. Techniques of Hazard Identification Hazard and Operability Studies (HAZOP), HAZAP, FAULT TREE analysis , tree event analysis, Safety Audits, Hazard Analysis. 4. Introduction to SIL. (Safety integrity level).	13

Reference Books:

1. Frank P Lees, "Loss Prevention in Process Industries" Volume 1, 2 &3
2. Industrial Organization and Economics by T.R. Banga& S.C.Sharma

Text Books:

1. Environment Engg. by Metcalf andEddy
2. Environmental Pollution Control Engineering by C.S.Rao.
3. Pollution control &Safety management, K.U.Mistry.

SWARNIM STARTUP AND INNOVATION UNIVERSITY

CHEMICAL ENGINEERING (05)
CHEMICAL REACTION ENGINEERING – I
SUBJECT CODE:
B.E. 6thSEMESTER

Type of course: Chemical Engineering

Prerequisite: Basic knowledge of material and energy balances in chemical engineering applications, laws of thermodynamics.

Rationale: This subject introduces concepts of reaction rate, derivation of rate expressions from reaction mechanism, ideal reactor types, integral method of analysis, differential method of analysis, principles of chemical reactor analysis and design, experimental determination of rate equations, design of batch and continuous reactors, how to choose the most appropriate reactor for a given feed, optimization of selectivity in multiple reactions, consideration of temperature and pressure effects, etc.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks			Total Marks
				Theory Marks		Practical Marks	
L	T	P	C	ESE (E)	PA (M)	PA (I)	
3	0	2	4	70	30	50	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction to Reaction Engineering:** Classification of reactions, definitions of reactions rate, variables affecting reaction rate, speed of chemical reactions.	2	3
2	**Kinetics of homogenous reactions:** Simple reactor types, the rate equation, concentration dependent term of rate equation. Molecularity and order of reaction. Rate constant *k*, representation of an elementary and non elementary reaction. Kinetic models for non elementary reactions. Testing kinetic models. Temperature dependant term of rate equations from Arrhenius theory and comparison with collision and transition state theory. Activation energy and temperature dependency. Predictability of reaction rate from theory.	8	8
3	**Interpretation of Batch reactor data:** Constant volume batch reactor, analysis of total pressure data, Integral and differential methods of analysis of data for constant volume and variable volume cases. Temperature and reaction rate, search for a rate equation.	8	11
4	**Introduction to reactor design & Ideal reactors for single reaction:** Mass and energy balances around a volume element. Ideal batch reactor, steady-state mixed flow reactor, steady-state plug-flow reactor, holding and	8	08

	space time for flow reactors, space-time and space velocity. Introduction to semi batch reactor.		
5	**Design of reactor for single reactions:** Size comparison of single reactors, multiple reactor systems, recycles reactor and autocatalytic reactions.	4	04
6	**Design for parallel reactions:** Introduction to multiple reactions, qualitative and quantitative treatment of product distribution and of reactor size, the selectivity.	4	03
7	**Potpourri of multiple reactors:** Irreversible first order reactions in series, kinetic studies and design. First order followed by zero order reaction, zero order followed by first order reaction, successive irreversible reactions of different orders, reversible reactions, irreversible series-parallel reactions.	5	07

Reference Books:

1. Octave Levenspiel, Chemical Reaction Engineering, 3rd Edition, Wiley-India Pvt.Ltd.
2. H. Scott Fogler, Elements of Chemical Reaction Engineering, 4thEdition, Prentice Hall of India Pvt. Ltd
3. J.M. Smith, Chemical Engineering Kinetics, 2ndedition,McGraw-Hill.
4. L. D. Schmidt, the Engineering of Chemical Reactions, OxfordPress.

Course Outcome:

After learning the course the students should be able to:

- Build basic knowledge of classification ofreactions.
- Understand kinetics of competing reactions and their influence on product yield and selectivity.
- Understand fundamentals of kinetics including definitions of rate and forms of rate expressions and relationships between moles, concentration, extent of reaction andconversion.
- Derive batch, CSTR, and PFR performance equations from general materialbalances.
- Do size and performance calculations on isothermal plug, mixed, and batch reactors for a homogeneous and heterogeneous reaction from given rate data or a rateexpression.
- Develop skills to choose the right reactor among single, multiple, recycle reactorsetc.
- Understand and apply the concepts of heat capacity, latent heat, heat of reaction, heat of combustion, and heat offormation.

List of Experiments:

1	To determine the activation energy of the reaction between sodium thio-sulphate and HCl using Arrhenius Equation.
2	To determine order of reaction for the reaction between sodium thio sulphate and HCl
3	To measure the kinetics of a reaction between ethyl acetate and sodium hydroxide under condition of Excess ethyl acetate at room temperature.
4	To determine the kinetics of the reaction between ethyl acetate and sodium hydroxide at room Temperature by the integral method of analysis.
5	To determine the activation energy and frequency factor for reaction between ethyl acetate and sodium Hydroxide at room temperature & at different temperature.
6	To determine the kinetics of the reaction between ethyl acetate and sodium hydroxide at room Temperature by the differential method of analysis.

7	To determine the kinetics of the reaction between n- butyl acetate and sodium hydroxide at room Temperature by the integral method of analysis.
8	To determine the kinetics of the reaction between n- butyl acetate and sodium hydroxide at room temperature by the differential method of analysis

Open Ended Projects:

Minimum **5** practical's to be performed and remaining time should be allotted to open-ended projects / study reports / latest outcomes in technology study :-

1. In the beginning of the academic term, faculties will have to allot their students at least one Open-ended Project / Study Report / Latest outcome intechnology.
2. Literature survey including patents and research papers of fundamentalprocess
   - Design based small projector
   - Study report based on latest scientific developmentor
   - Technology study report/ modeling/ simulation/collection reportor
   - Computer based simulation/ web based application/ analysis presentations of basic concept field which may help them in chemicalengineering.
3. These can be done in a group containing maximum **three** students ineach.
4. Faculties should cultivate problem based project to enhance the basic mental and technical level of students.
5. Evaluation should be done on **approach of the student on his/her efforts** (not on completion) to study the design module of giventask.
6. In the semester student should perform **minimum** 5 set of experiments and complete **one small open ended dedicated project**based on engineering applications. This project along with any performed experiment should be **EVALUATED BY EXTERNALEXAMINER.**

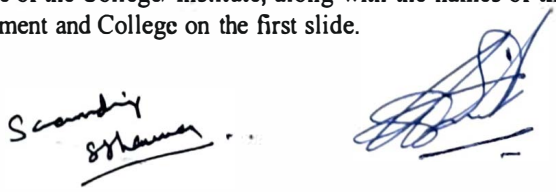
Open Ended Project Fields:

- Non working models of batch plug and mixed flowreactors.
- Designing reactors for exemplaryreactions.
- Analyzing reactor data for higher orderreactions.
- Studies related to advancements in reactionkinetics.

List of Open Source Software/learning website:

- NPTEL lectureseries
- Literature available on Chemical ReactionEngineering.
- MIT Open course lecture on Chemical Reaction Engineering.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide.



SWARNIM STARTUP AND INNOVATION UNIVERSITY

CHEMICAL ENGINEERING (05)

ADVANCED SEPARATION TECHNIQUES

SUBJECT CODE:
B.E. 6th SEMESTER

Type of course: Chemical Engineering.

Prerequisite: None.

Rationale: Separation techniques are integral unit operation in most of the modern chemical, pharmaceutical and other process plants. There are many standard and conventional separation techniques available in the market and these techniques are quite common and the relevant technologies as well as well-developed and well-studied. On the other hand, newer separation processes, like, membrane based techniques, chromatographic separation, super critical fluid extraction, etc., are gaining importance in modern days plants. The present course is designed to emphasize on these novel separation processes. The course is designed for an elective subject of final year undergraduate students.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks			Total Marks
				Theory Marks		Practical Marks	
L	T	P	C	ESE (E)	PA (M)	PA (I)	
3	0	2	4	70	30	50	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- ProgressiveAssessment

Content:

Sr. No.	Topic	Teaching Hours	Weightage (%)
1.	**Super Critical Extraction** Working Principal, Advantage & Disadvantages of supercritical solvents over conventional liquid solvents, Advantage & Disadvantages of supercritical extraction over liquid- liquid Extraction, Decaffeination, ROSE process, Commercial applications of supercritical extraction.	05	06
2.	**Short path Distillation:** Concept & working of short path Distillation Unit (SPDU), Difference between short path Distillation & molecular Distillation, applications of SPDU.	04	03
3.	**Reactive & Catalytic Distillation:** Concept, Advantage & Disadvantages, BALE &KATMAX packing Manufacturing of MTBE and ETBE and it's comparison with conventional techniques.	04	04

4.	**Pressure Swing Distillation:** Concept & Working, Advantage & Disadvantages of PSD over isotropic and Extractive Distillation, Applications	04	04
5.	**Membrane separation technique:** Principles, mechanisms, cross flow, membrane materials and various membrane modules used in membrane separation processes, Classification, application & advantages of membrane separationprocesses.	05	06
6.	**Pressure Swing Adsorption:** Concept & Working, Advantages & Disadvantages of PSA over cryogenic distillation, four step PSA, six step PSA, Purification of hydrogen, oxygen, Nitrogen & other commercial applications of PSA.	06	05
7.	**Melt crystallization:** Concept, phase equilibrium, different techniques, commercial applications	04	04
8.	**Reverse Osmosis:** Concept of osmosis and reverse osmosis, different types of membrane modules and membrane material for R.O., Advantages and commercial applications ofR.O.	06	04
9.	**Ultrafiltration and nano filtration:** Concept & working principal ultrafiltration Vs Conventional filtration, Ultrafiltration membranes and modules, Commercial applications of ultrafiltration and nano filtration.	06	05
10.	**Pervaporization:** Working principal, Advantages, Production of absolute alcohol and other commercial applications.	05	03
11.	**Membrane Reactor:** Concept & working, Various modules of membrane used for membrane reactor, Advantages & Disadvantages, applications under research	05	04

Text Books:

1. "Membrane separation Processes" by KaushikNath, PHI pvt. Ltd.,2008
2. "Introduction to process Engineering & Design" by S.B. Thakore& B.I Bhatt, Tata McGraw-Hill Ltd.,2007

Reference Books:

1. Perry Chemical Engineers Handbook' 7th Edition by R.H Perry and D.Green.
2. Ullman's Encyclopedia of IndustrialChemistry.
3. "Encyclopedia of Chemical Engineering" by Kirk &Othmer.
4. "Natural Extracts using supercritical carbon dioxide" M.Mukhopadhyay

Course Outcome: After learning the course the students should be able:

1. To built advanced concepts of separation techniques used in chemicalindustries.
2. To understand the principles and functioning advanced separationtechniques.
3. To utilize the advanced separation technique in problem solving where conventional techniques are not fruitful and requirereplacement.
4. To understand the applications of advanced separation techniques as per industrialrequirement..
5. To recognize the selection criteria between advanced separation techniques and conventional separationtechniques.

List of Experiments:

Minimum 5 practicals to be performed and remaining time should be allotted to open-ended projects/study reports/latest outcomes in technology study:-

1. In the beginning of the academic term, faculties will have to allot their students at least one Open-ended Project / Study Report /Latest outcome in technology.
2. Literature survey including patents and research papers of fundamentalprocess
- Design based small projector
- Study report based on latest scientific developmentor
- Technology study report/modeling/ simulation/collection reportor
- Computer based simulation/web based application/analysis presentations of basic concept field which may help them in chemicalengineering.
3. These can be done in a group containing maximum **three** students
4. Faculties should cultivate problem based project to enhance the basic mental and technical level of students.
5. Evaluation should be done on approach of the student on his/her efforts (not on completion)to study the design module of giventask.
6. In the semester student should perform **minimum** 5 set of experiments and complete one small open ended dedicated project based on engineering applications. This project along with any performed experiment should be **EVALUATED BY EXTERNALEXAMINER.**

List of Practicals:

1.	Perform separation techniques using reactive distillation.
2.	Perform separation using membrane modules.
3.	Perform separation techniques using supercritical extraction
4.	Preparation of membrane modules for reverse osmosis.
5.	Perform separation techniques using short path distillation.

Design based Problems (DP)/Open Ended Problem:

Open Ended projects in advanced analytical techniques may include:

1. Review chart of application of advanced separation techniques in processindustries.
2. Fabrication of reactive catalytic distillation unit.
3. Fabrication of short pathdistillation.
4. Fabrication and performance evaluation of different types of filtrationmembranes,
5. Fabrication of membranemodule

List of Open Source Software/learning website:

- Students can refer to video lectures available on various websites includingNPTEL.
- Students can refer to the CDs which are available with some reference books for the solutions of problems using softwares. Students can develop their own programs for the solutions using excel, Chemical and other simulations of software's.

ACTIVE LEARNING ASSIGNMENTS:

Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide.

SWARNIM STARTUP AND INNOVTION UNIVERSITY

CHEMICAL ENGINEERING (05)

BIOCHEMICAL ENGINEERING
SUBJECT CODE:
B.E. 6thSEMESTER

Type of course: Department Elective – I

Prerequisite: Basics of Mass Transfer Operations and Reaction Kinetics

Rationale: This subject is an integration of chemical engineering with biological systems. It deals with kinetics of biological reactions, designing of biological reactors and recovery mechanisms of biochemical products.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks			Total Marks
				Theory Marks		Practical Marks	
L	T	P	C	ESE (E)	PA (M)	PA (I)	
2	0	2	3	70	30	50	150

Course Contents:

Sr. No.	Topics	Teaching Hours	Weightage %
1	**Introduction to Biochemical Engineering** Historical background, interdisciplinary approach, Integrated bioprocess systems, Unit Operations in Bioprocess	03	03
2	**Microbial Growth Kinetics** Batch Culture, Continuous Culture – Multistage systems, Feedback systems, Fed Batch Culture – Variable volume, fixed volume, Cyclic. Applications.	08	11
3.	**Design of Fermentor** Introduction, Basic Functions, Body construction, Aeration and Agitation, Maintenance of aseptic conditions, Control of parameters, Valves and steam traps, Variants of fermentation vessels.	14	11
4.	**Aeration and Agitation** Introduction, Oxygen requirement in fermentations, Oxygen supply, Determination of K_La values, Fluid rheology, Factors Affecting K_La values, Balance between oxygen demand and supply, Scale up and Scale down.	11	11
5.	**Basic Outline of fermentation process and purification of fermentation products** Introduction, Range of fermentation process, Components of fermentation process, Disruption of cells, precipitaiton, fitration, Centrifugation, Liquid Liquid Extraction, Chromatography, Membrane processes, Drying, Crystallization	16	15

Reference Books:

1. Principles of Fermentation Technology, by Whitaker, Peter F Stanbury, S. Hall and A. Whitaker, Publisher: Butterworth-Heinemann; 2nd edition.
2. Bioprocess Engineering Principles by Pauline Doran, Publisher: Elsevier Science & TechnologyBooks.
3. Introduction to Biochemical Engineering by D. G. Rao, Tata McGraw-Hill Education,2005.
4. Biochemical Engineering and Biotechnology by Ghasem D. Najafpour, Publisher: Elsevier Science & TechnologyBooks.

Course Outcome:

After learning the course, the students should be able to:

- Develop a fundamental understanding interdisciplinary approach of bioprocesssystems.
- Compare batch, fed batch and continuoussystems.
- Understand different parts of bioreactor and itsworking.
- Evaluate different mass transfer operations used in biochemicalindustries.

List of Experiments:

1. Determination of Oxygen Transferrate.
2. Determination of K_La value.
3. To obtain growth curve of bacteria under batchculture.
4. To obtain growth curve of bacteria under fed batchculture.
5. To carry out precipitation ofprotein.
6. To perform columnchromatography.
7. To perform dryingoperation.
8. To perform crystallizationoperation.

Open Ended Problems:

Students are free to select any project related to Biochemical engineering based on its application in the field of Biotechnology. Some of the suggested projects are:

- To perform formulation of some bio products.

- To perform downstreamingof somebioproducts.

List of Open Source Software/learning website:

Students can refer to video lectures available on the websites including NPTEL. Students can refer to the CDs which are available with some reference books. Students can develop their own flowsheets for demonstration of various fermentation processes and the downstreamingprocess.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.

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SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ENVIRONMENTAL ENGINEERING

ADVANCED ENVIRONMENTAL INSTRUMENTATION

SUBJECT CODE: 2410501

B.E. 5TH SEMESTER

Type of course: Basic Science

Prerequisite: Knowledge of subjects Environmental Sciences I and II

Rationale: To learn the advanced analytical techniques for analysis of water, wastewater and air samples

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	-
3	0	4	7	5	30	20	70	30	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction to instrumental method of analysis:** Background, Instrumental methods of analysis.	02	05
2	**Spectroscopic Methods of Analysis:** Electromagnetic spectrum, Applications of Beer- Lambert law, Visual Colourimetry, UV-Visible spectrophotometry, Infrared Spectroscopy, Raman Spectroscopy, Atomic Absorption Spectroscopy, Flame Emission Spectroscopy and Mass Spectroscopy.	10	24
3	**Turbidimetry and Nephelometry:** Visual method and instrumental method of turbidity measurement.	04	10
4	**Chromatography:** Classification of chromatographic methods, Column Chromatography, Liquid Chromatography, Adsorption Column Chromatography, Ion exchange Chromatography, Gas Chromatography, High Performance	10	24

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	Liquid Chromatography and Ion Chromatograph.		
5	**Miscellaneous Methods**: Conductometry, Potentiometry, Ion selective electrodes, Dissolved oxygen sensors, TOC analyzer and On line sensors.	10	24
6	**Errors and Treatment of statistical data:** True value, Precision, accuracy, error, mean and median, spread, deviation, standard deviation, coefficient of variation, variance, significant figures, types of errors, statistical treatment of random errors, evaluation of experimental results and comparison of results.	06	12

Reference Books:

1. Standard methods for the examination of water and wastewater; published by American public Health Association, American water works Association, Water pollution control federation (21st Edition & later).
2. Chemistry for Environmental Engineering by Sawyer and M C Carty (4th Edition-McGraw-Hill Publishing Company Ltd.).

Course Outcomes:

After learning the course the students should be able to do:

1. Use the instrumental method of analysis.
2. Demonstrate the ability to operate sophisticated state of art analyticalinstrument to quantify micro level contaminants.
3. Exhibit the capability to operate and calibrate analytical instruments likeTOC analyzer and Ion selective meter.
4. Carry out statistical analysis of the data.

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List of Experiments:

1. Determination of turbidity from water sample using Nephelo-turbidity meter.
2. Determination of fluoride concentration in drinking water using spectrophotometer.
3. Colorimetric analysis for copper using UV-Vis spectrophotometer.
4. Preparation of calibration curve of chromium using UV- Vis spectrophotometer.
5. Determination of chromium using Atomic AbsorptionSpectrophotometer.
6. Determination of nickel using Atomic AbsorptionSpectrophotometer.
7. Determination of copper using Atomic AbsorptionSpectrophotometer.
8. Determination of arsenic using Atomic AbsorptionSpectrophotometer.
9. Determination of cations and anions using Ion-Chromatograph.
10. Determination of TOC from wastewater using TOC analyzer.

Design based Problems (DP)/Open Ended Problem:

(Based on working principle & application in Environmental Engineering)

1. Flame photometer
2. Gas Chromatograph
3. High Performance Liquid Chromatograph

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to Swarnim Startup & Innovation University.

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SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ENVIRONMENTAL ENGINEERING

PHYSICO - CHEMICAL TREATMENT TECHNOLOGIES

SUBJECT CODE: 2410502

B.E. 5TH SEMESTER

Type of course: Applied Science

Prerequisite: Knowledge of subjects Environmental Sciences I and II

Rationale: To learn the principles and theories behind the treatment of water and wastewater by physical and chemical processes

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	-
4	0	2	6	5	30	20	70	30	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction:** Characteristics of water and wastewater, types of treatment, conventional water and wastewater treatment, Analysis of wastewater flow rates: Components of wastewater flows, statistical analysis, constituent characteristics and mass loadings.	06	11
2	**Preliminary treatment of water and wastewaters:** Screens, purposes, types of screens and head loss in screens; Gritchambers: purposes and types of grit chambers.	06	11

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3	**Primary Treatment of water and wastewater :** I. Coagulation and Flocculation: Colloid characteristics, chemistry of metallic coagulants, polyelectrolytes as coagulant, mixing of coagulants, power requirement; Flocculation: Types of flocculation, types of flocculators, Design considerations, power requirement. II. Sedimentation: Purposes, Sedimentation types, Sedimentation Zones, Types of sedimentation tanks, Analysis of discrete settling, flocculant settling, zone settling and compression settling, design parameters, tube settlers. III. Filtration: Mechanisms of filtration, hydraulics of filtration, different types of filters, filter clogging, filter washing. IV. Disinfection: Purposes, Characteristics of ideal disinfection, Disinfection methods and mechanisms, Factors affecting, Disinfection with chlorine, chlorine dioxide, ozone, ultraviolet radiation.	34	60
4	**Sludge dewatering , treatment and disposal:** Sources of sludge, estimation of bulk density of sludge, principles of dewatering, methods of dewatering and the suitability, dewatering machines, chemical conditioning, elutriation, vacuum and pressure filtration, thickening of waste sludges, sludge drying beds, design of sludge drying beds, Aerobic and anaerobic sludge digestion.	10	18

Reference Books:

1. Water Supply & Sewage Systems by McGhee (5th Edition-McGraw-Hill Kogakusha Ltd.).
2. Waste water Engineering Treatment & Reuse by Metcalf and Eddy (4th Edition – Tata McGraw-Hill Publishing Company Ltd.).
3. Environmental Engineering by Peavy and Rowe.
4. Environmental Engineering by Mckenzie Davis and Cornwell (3rd Edition-published by WCB McGraw-Hill).
5. Wastewater Treatment for Pollution Control by Soli J Arceivala (2nd Edition- Tata McGraw-Hill Publishing Company Ltd.).

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Course Outcome:

1. After learning the course the students should be able to do:
2. Identify the physical and chemical treatment units.
3. Relate the parameters with types of treatment required andidentify the types of treatment required.
4. Evaluate the removal efficiencies of physico-chemical treatment units.
5. Select optimized dose of chemical coagulation as well asdisinfecting agents.
6. Justify the types of disinfection process for treatment of water.

List of Experiments:

1. Determination of optimum coagulant dose using multiple Jar Test Apparatus.
2. To study the adsorption of the given organic acid on charcoal.
3. Determination of effect of coagulant dose on pH of water.
4. Determination of effect of coagulant dose on alkalinity of water.
5. To measure Ammonical Nitrogen from waste water.
6. Determination of Residual Chlorine in drinking water.
7. Determination of removal efficiency in Type I settling using Settling Column.
8. To determine the sludge volume idex of wastewater sample.
9. To study the settling behavior of granular sludge.
10. To study the different adsorption isotherm of given organic acid on charcoal.

Design based Problems (DP)/Open Ended Problem:

1. Sketches & description of water treatment processes
1. Questions and numericals on Screens
2. Questions and numericals on Grit chamber
3. Questions and numericals on Coagulation & flocculation/flash mixer
4. Questions and numericals on Sedimentation
5. Questions and numericals on Filtration
6. Numericals on determination of Solid
7. Questions and numericals on Disinfection

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to Swarnim Startup & Innovation University.

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SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ENVIRONMENTAL ENGINEERING

MUNICIPAL AND INDUSTRIAL SOLID WASTE MANAGEMENT

SUBJECT CODE: 2410503

B.E. 5TH SEMESTER

Type of course: Applied Science

Prerequisite: Knowledge of subjects Environmental Sciences I and II

Rationale: To understand the water supply and sewage collection systems in cities

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	-
3	2	0	5	4	30	20	70	30	150

Content:

Sr. No.	Course Contents	Total Hrs	% Weightage
1	**Solid Waste Terminology:** Introduction, Solid waste, Terminologies of solid waste.	1	2
2	**Municipal Solid Waste Generation, Onsite Handling, Storage and Processing:** Sources; Characteristics; Composition; Generation rate, Handling Methods; Factors Considered for Storage; Onsite Processing.	5	10
3	**Collection, Transfer and Transport of Solid Waste:** Collection Services, Collection Systems and Equipments, Need, Transfer stations, Means of Transport, Location of Transport Station.	5	13
4	**Processing and Recovery of Municipal Solid Waste:** Importance, Processing Techniques Equipments :Compaction, Incineration, Shredding, Component Separation, Drying and Dewatering, Material	10	25

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	Recovery, Recovery of chemical and biological products, Recovery of Energy.		
5	**Disposal of Solid Waste and Residual Matter :** Landfilling Methods, Basic Aspects of Landfill Implementation, landfill operations, post-closure care and use of old landfills, landfill mining.	6	20
6	**Hazardous Waste Management:** Definition, Identification And Classification Of Hazardous Solid Waste, Waste Minimization, Waste Exchange, Recycling.	5	10
7	**Treatment Technologies and Disposal of Hazardous solid Waste:** Biological, Chemical; Physico-Chemical Treatment: Incineration, Stabilization, Solidification, Secured landfills, Incinerators.	8	10
8	**Biomedical Waste Management:** Sources, Generation;Classification, Storage, Transportation, Disposal, Waste Treatment: Disinfection, Irradiation, Incineration.	4	10

Reference Books:

1. Environmental Engineering by Arcadio Sincero and Gregoria Sincero, Second Edition,Prentice - Hall India.
2. Integrated Solid Waste Management: Engineering Principles and Management Issues by George Tchobanoglous, McGraw-Hill Publication.
3. Hazardous Waste Management by M LaGrega and others, McGraw-Hill Publication.

Course Outcome:

After learning the course the students should be able to do:

1. Realize the dilemma of solid waste and the functional elements of a solid and Hazardouswaste management system.
2. Classify the sources, types, composition and quantities of solid waste.
3. Identify the physical, chemical and biological properties of solid waste.
4. Take measure to collection, transfer, transport, separate and process of solid and Hazardouswaste.
5. Appraise aspects and issues related to recycling and composting of solid waste.
6. Use of incineration for disposal of solid waste.
7. Design aspects related to land disposal of solid and Hazardous waste.

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List of Tutorials:

1. Examples based on Generation Rate of solid waste.
2. Questions based on Sources & Characteristics of Municipal Solid Waste.
3. Questions based on Onsite Handling, storage and processing of Solid waste.
4. Examples on Haul Container System and Stationary Container System.
5. Questions based on Transfer and Transport of Solid Waste.
6. Questions based on processing of Municipal Solid Waste.
7. Questions based on Recovery of Resources, Conversion Products & energy from MSW.
8. Questions based on Disposal of Solid Waste.
9. Questions based on Hazardous Solid Waste.
10. Biomedical Waste management.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The Power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to Swarnim Startup & Innovation University.

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DEPARTMENT OF ENVIRONMENTAL ENGINEERING

MUNICIPAL ENGINEERING

SUBJECT CODE: 2410504

B.E. 5TH SEMESTER

Type of course: Applied Science

Prerequisite: Knowledge of subjects Environmental Sciences I and II

Rationale: To understand the water supply and sewage collection systems in cities

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	-
4	2	0	6	5	30	20	70	30	150

Content:

Sr. No.	Content	TotalHrs	% Weightage
1	**Water supply scheme:** Importance & necessity of water supply scheme, Importance and reliability of water works, essentials of water supply engineering.	3	4
2	**Sources and Quantity of water:** Surface water sources and ground water sources, Type of demand. Per capita demand, design period, fluctuation in demand of water, factors affecting demand of water.	11	14
3	**Pumps and Pumping stations:** Need of pumping, classification of pumps, different type of pumps used in water supply, power of pumping, total lift of pump, H.P of pump, location of pumping station, site selection.	7	10

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4	**Collection and conveyance:** Intakes, type of intake, conveyance of water, different type of pipesused in water supply, pipe-joint, laying of pipe, hydrostatic test.	11	10
5	**Distribution system:** Type of distribution system, different layout of distribution system, methods of supplying water, pressures in distribution system, distribution resources and its capacity, type of reservoirs & accessories, design of distribution system, design of pipelines and analysis of complex pipe Networks-Hard cross method.	7	6
6	**Valves and Fittings:** Different type of valves, hydrants, meters, stop cock & water tap, pipe fittings, leakage & waste of water factors, affecting losses & wastes.	7	6
7	**Sanitary works and Systems of sanitation:** Definitions, sanitary works, objectives of sewage disposal, Methods of collection, conservancy systems, collection system, water carriage system, sewerage system.	6	7
8	**Quantity of sanitary and storm sewage:** Sources of sanitary sewage, factors affecting and determination of quantity of sanitary sewage, factor affecting storm sewage and determination of quantity of storm sewage.	7	6
9	**Construction, maintenance and Design of sewers:** Laying of sewers, jointing of sewers, hydraulic testing of pipe sewers, maintenance of sewers, sewer cleaning equipments and devices, Design period, per capita sewage flow, ground water infiltration, estimation of storm runoff, flow assumption, determination of velocity offlow.	13	16
10	**Drains and sewers:** Drains, sewers: sections, sewer material, sewer drawings, corrosion prevention in sewers.	3	5
11	**Sewers appurtenances:** Manhole, street inlet, flushing tanks, catch basins, inverted siphon, ventilation of sewers.	11	10
12	**House plumbing:** Terms, Plumbing tools, traps and system of plumbing.	5	6

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Reference Books:

1. Water supply and sewage system – G. Birdie
2. Water supply and sewage system - Steel and McGhee
3. Water Supply & Sewage Systems - K.N. Duggal
4. Water Supply & Sewage Systems – S. K. Garg

Course Outcome:

After learning the course the students should be able to do:

1. Identify the sources of water and evaluate resources in terms of quantity and quality.
2. Estimate the water demand considering future projection of population.
3. Plan the components of water supply scheme including pipe network, distribution systems, valves and fitting.
4. Estimate the quantity of sanitary and storm sewage.
5. Identify the types of sewers and sewer appurtenances.
6. Design the components of sewage system.

List of Tutorials:

1. Water supply scheme
2. Quantity of water
3. Pump and pumping station
4. Collection and conveyance of water: Intake works, Pipes. Pipe joints
5. Distribution system
6. Design of distribution system-examples
7. Valves and fittings
8. Sanitary works and system of sanitation
9. Quantity of sanitary and storm water
10. Design of sewers-examples
11. Sewer appurtenances
12. Construction and maintenance of sewers
13. House plumbing

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to Swarnim Startup & Innovation University.

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SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ENVIRONMENTAL ENGINEERING

DISASTER MANAGEMENT

SUBJECT CODE: 2410506

B.E. 5TH SEMESTER

Type of course: Applied Mechanics

Prerequisite: NA

Rationale: This subject is conceptual applications of principles of management to mitigate various disasters.

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	-
3	0	0	3	3	30	20	70	30	150

Content:

Sr. No.	Topics	Teaching Hrs.	Weightage %
1	**Understanding Disasters:** Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity – Disaster and Development, and disaster management.	4	10
2	**Types, Trends, Causes, Consequences and Control of Disasters:** Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves); Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Man- made Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters); Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters.	8	20

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3	**Disaster Management Cycle and Framework:** Disaster Management Cycle – Paradigm Shift in Disaster Management Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action.	8	20
4	**Disaster Management in India:** Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter-Governmental Agencies.	10	20
5	**Applications of Science and Technology for Disaster Management &Mitigation:** Geo-informatics in Disaster Management (RS, GIS, GPS and RS) Disaster Communication System (Early Warning and Its Dissemination) Land Use Planning and Development Regulations Disaster Safe Designs and Constructions Structural and Non Structural Mitigation of Disasters S&T Institutions for Disaster Management in India.	12	30

Reference Books:

1. Coppola D P, 2007. Introduction to International Disaster Management, Elsevier Science (B/H), London.
2. Manual on natural disaster management in India, M C Gupta, NIDM, New Delhi.
3. An overview on natural & man-made disasters and their reduction, R K Bhandani, CSIR, New Delhi.
4. World Disasters Report, 2009. International Federation of Red Cross and Red Crescent, Switzerland.
5. Encyclopedia of Disasters – Environmental Catastrophes and Human Tragedies, Vol. I & 2,Angus M. Gunn, Greenwood Press, 2008.
6. Disasters in India Studies of grim reality, Anu Kapur & others, 2005, 283 pages, Rawat Publishers, Jaipur.
7. Management of Natural Disasters in developing countries, H.N. Srivastava & G.D. Gupta, Daya Publishers, Delhi, 2006, 201 pages.
8. Natural Disasters, David Alexander, Kluwer Academic London, 1999, 632 pages.

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9. Disaster Management Act 2005, Publisher by Govt. of India.
10. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management.
11. NIDM Publications.
12. High Power Committee Report, 2001, J.C. Pant.
13. Disaster Mitigation in Asia & Pacific, Asian Development Bank.
14. National Disaster Management Policy, 2009, GoI.
15. Disaster Preparedness Kit, American Red Cross.
16. Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
17. Carter, W. Nick, 1991: Disaster Management, Asian Development Bank, Manila.
18. Sahni, Pardeep et.al. (eds.) 2002, Disaster Mitigation Experiences and Reflections, Prentice Hall of India, New Delhi.
19. Roy, P.S. (2000): Space Technology for Disaster management: A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing (NRSA) Dehradun.
20. Sharma, R.K. & Sharma, G. (2005) (ed) Natural Disaster, APH Publishing Corporation, New Delhi.

Course Outcome:

After learning the course the students should be able to:

1. Understand disasters, disaster preparedness and mitigation measures.
2. Understand role of IT, remote sensing, GIS and GPS in risk reduction.
3. Understand disaster management acts and guidelines along with role of various stack-holders during disasters.

List of Open Source Software/learning website:

1. www.gis.com
2. Develent.net
3. www.iirs.nrsa.org
4. http://quake.usgs.gov
5. www.nidmindia.nic.in

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to Swarnim Startup & Innovation University.

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SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ENVIRONMENTAL ENGINEERING

BIOLOGICAL PROCESSES FOR WASTEWATER TREATMENT

SUBJECT CODE: 2410601

B.E. 6TH SEMESTER

Type of course: Applied Science

Prerequisite: Knowledge of subjects Environmental Sciences I and II

Rationale: To learn the principles and theories behind the treatment of wastewater by biological processes

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	-
4	2	0	6	5	30	20	70	30	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Measurement of Organic Pollutant:** Parameters - BOD, COD &TOC, Factors affecting BOD test, BOD equations, methods of estimating BOD, Biological v/s Physicochemical analysis.	08	14
2	**Introduction to Biological Treatment:** Overview of biological wastewater treatment, objectives of the treatment, role of micro-organisms, types of biological processes for wastewater treatment, suspended and attached growth systems.	06	10
3	**Microbial Growth Kinetics:** Microbial Growth Kinetics terminology, rate of utilization of soluble substrates, other rate expression for the utilization of soluble substrate, rate of biomass growth with soluble substrate, rate of oxygen uptake, effects of temperature, total	10	18

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	volatile suspended solids and active biomass, net biomass yield and observed yield.		
4	**Aerobic Suspended Growth Biological Treatment Systems:** Aerobic biological oxidation, process description, environmental factors **Modifications of ASP:** Complete Mix activated sludge, Extended Aeration system, Oxidation Ditch systems, Intermittently aerated and decanted systems, Oxygen activated sludge, Oxidation ponds, stabilization ponds **Aerobic attached Growth Biological Treatment systems:** Introduction to attached growth systems, Trickling Filter, Oxygen transfer and utilization, Applications rotating biological contactors, Bio-Towers	10	18
5	**Anaerobic Decomposition:** Mechanism of anaerobic fermentation – a multistep process, Microbiology and biochemistry of anaerobic processes, substrate inhibition, optimal anoxic environment, kinetic constants, stuck reactors, standard rate, high rate and multistage anoxic digesters.	14	25
6	**Natural Treatment Systems:** Development of natural treatment systems, fundamental consideration in the application of NTS, Slow Rate systems, rapid infiltration systems, Overland flow systems, constructed wetlands, Floating aquatic plant treatment systems.	08	15

Reference Books:

1. Waste water Engineering Treatment & Reuse by Metcalf and Eddy.
2. Wastewater treatment for pollution control by Soli J Arceivala (Tata MeGraw-Hill).
3. Biological Process Design for wastewater treatment by Larry D. Benefield & Ctifford W. Randall(Prentice Hall).
4. Anaerobic biotechnology for Industrial waste by R. E. Speece (Archae press).
5. Environmental Engineering – A design approach by Arcadio P. Sincero & Grecjoria A. Sincero(Prentice Hall of India).

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Course Outcome:

After learning the course the students should be able to:

1. Apply fundamental concepts of microbiology in biological treatment processes of wastewater.
2. Develop the reaction rate kinetics for biological treatment.
3. Compute the dimensions of biological treatment units.
4. Quantify the Organic pollutants present in waste water.
5. Give differences between aerobic and anaerobic treatment, process, Suspended growth andattached growth processes.
6. Design onsite system including septic tanks and pack edge treatment plants.

List of Tutorials:

1. Determination of COD of given wastewater sample.
2. Determination of BOD of given wastewater sample.
3. To find BOD reaction rate constant for given sample.
4. To find rate of re-aeration of tap water.
5. Examples on BOD.
6. Examples of Aerobic suspended attached growth.
7. Anaerobic Treatment of wastewater.
8. Design examples of Aerobic Treatment of wastewater – ASP, TF and RBC.
9. Natural treatment system and small wastewater treatment system.
10. Design examples for anaerobic reactor such as standard rate and high rate.

Major Equipment:

1. COD digestion apparatus.
2. BOD incubator
3. Monopan balance

List of Open Source Software/learning website: http://nptel.ac.in/

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to Swarnim Startup & Innovation University.

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SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ENVIRONMENTAL ENGINEERING

DESIGN OF WATER TREATMENT UNITS

SUBJECT CODE: 2410602

B.E. 6TH SEMESTER

Type of course: Applied Science

Prerequisite: Knowledge of subject Physico chemical Treatment Technologies

Rationale: To learn the procedure and calculations for design of water treatment plant

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	-
4	2	0	6	5	30	20	70	30	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Sources of water and water treatment schemes:** Regulatory water quality standards, Selection criteria, Surface water treatment, Ground water treatment.	5	10
2	**Flow measuring devices for water treatment:** Introduction, Different flow measuring devices.	4	5
3	**Screens for water treatment:** Introduction, Types of screen, Design of screens.	4	5
4	**Rapid mixers & flocculators:** Chemical dosing calculations, Chemical mixing devices, Types and design of rapid mixers, Types and design of flocculators.	5	10

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5	**Clarifiers , Clariflocculators & tube settlers for water treatment:** Types of sedimentation tanks, Inlet and out let arrangements, Design of plain sedimentation tanks: Rectangular and circular, Design of clariflocculator, Design of tube settlers.	5	10
6	**Filtration systems for water treatment:** Design of Rapid sand filter, Design of under drainage system and wash water trough, Design of multimedia filter.	5	10
7	**Disinfection** Chlorine dose calculations, Gas chlorination facilities and auxiliaries.	5	10
8	**Special water treatment** Process selection, Water softening calculations, Design of softeners, DM plants, RO plants, Iron and manganese removal, Deflouridation systems.	10	20
9	**Layout, hydraulic profile and residuals of water treatment plant:** Layout of water treatment plant, hydraulic profile of water treatment plant, Introduction, water treatment plant residuals.	9	15
10	**Point of use treatment /Domestic level treatment systems:** Water softeners, Activated Carbon filters, RO systems.	4	5

Reference Books:

1. Design of Water Treatment Plants by Dr A G Bhole Published by Indian Water Works Association.
2. Water Works Engineering Planning, Design & operation by Syed R Qasim,Edward M Motley &Guang Zhu Published by Prentice Hall of India.
3. Environmental Engineering – A design approach by Arcadio P. Sincero & Grecjoria A. Sincero(Prentice Hall of India).
4. Water Quality and treatment Published by American Water Works Association.

Course Outcome:

After learning the course the students should be able to:

1. Identify the source of water and select the treatment scheme based on the source selected.
2. Choose the flow measuring device.
3. Identify the different types of aeration systems, rapid mixers, flocculators and choose the relevanttype for water treatment plant.
4. Design sedimentation tanks, clariflocculator, filtration system and disinfection units for

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conventionalwater treatment plants.

5. Design treatment units for special water treatment.
6. Decide the layout and hydraulic profile of water treatment plant.
7. Prepare a detailed working drawing of the designed units.

List of Tutorials:

1. Sketches and description of treatment schemes for surface and ground water sources.
2. Sketches and description of flow measuring devices for water treatment.
3. Numericals on Chemical dosing and design of rapid mixers
4. Sketches and description of Rapid mixers and flocculators.
5. Sketches and description of types of sedimentation tanks.
6. Numericals on design of clariflocculators and tube settlers for water treatment.
7. Numericals on design of rapid sand filter.
8. Numericals on water softening calculations and design of softeners and DM plants.
9. Assignment on Iron and manganese removal.
10. Design of defluoridation systems.
11. Assignment on domestic level treatment systems.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submitted to Swarnim Startup & Innovation University.

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SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ENVIRONMENTAL ENGINEERING

FUNDAMENTALS OF AIR POLLUTION

SUBJECT CODE: 2410603

B.E. 6TH SEMESTER

Type of course: Applied Science

Prerequisite: Knowledge of subject's Environmental studies

Rationale: To learn the principles and theories behind atmospheric phenomena and air pollution due to emission of gaseous wastes.

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	-
3	0	2	5	4	30	20	70	30	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Air Pollution Sources:** Air Pollution, Sources of Air Pollution, Air Pollutants and their types, Types of fuels and air pollution caused by each fuel.	04	10
2	**Effects of air pollutants:** Effect on health, materials animals and plants, Units of measurement of Air Pollution, Ambient Air Quality Standards.	04	10
3	**Air quality monitoring:** Sampling and analysis of stack gases and ambient air, Procedure of Sampling and analysis of stack gases as per relevant IScodes; sampling and analysis of ambient air.	06	14

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4	**Meteorology:** Introduction, Atmosphere and its structure, solar radiation, wind circulation, lapse rates, stability conditions, wind velocity profile , maximum mixing depth, wind rose diagram, turbulence, general characteristics of stack plumes, heat island effect, global circulation of pollutants.	10	24
5	**Dispersion Of Pollutants In The Atmosphere:** Introduction: the Eddy diffusion model, Gaussian or normal distribution, the Gaussian dispersion models, evaluation of standard deviations, maximum ground level concentration, in line concentration, calculations of effective stack height.	10	24
6	**Noise Pollution:** Sound and Noise, Characteristics of sound, Noise Pollution, Noise Measurement Scale – Levels and the decibels, Sources of Noise, Effects of Noise on people, Indian Standards, noise pollution control.	6	14
7	**Odors and their Control:** Introduction, Odors, Control measures of odor.	2	4

Reference Books:

1. Air Pollution – by Wark & Warner
2. Air Pollution – by M. N. Rao
3. Air Pollution – by Henry Parkins
4. Air Pollution – by Stern Vol – I

Course Outcome:

After learning the course the students should be able to:

1. Assess the impacts of air pollution on human health, vegetation and materials.
2. Plan strategies to control, reduce and monitor pollution.
3. Relate the various atmospheric stability condition with different plume behavior.
4. Measure the concentration of different air pollutants in stack gases and in the ambient air.
5. Calculate the atmospheric dispersion of discharge from both point and area side sources.
6. Relate historic air pollution events, air quality legislation and relevant international protocols.

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List of Experiments:

1. Measurement of PM_{10} and $PM_{2.5}$ using High Volume Air Samplers for 8 hour averaging period.
2. Measurement of PM_{10} and $PM_{2.5}$ using High Volume Air Samplers for 24 hour averaging period.
3. Measurement of PM_{10} and $PM_{2.5}$ using High Volume Air Samplers for 24 hour averaging period at commercial area.
4. Measurement of PM_{10} and $PM_{2.5}$ using High Volume Air Samplers for 24 hour averaging period at majorly polluted area such as vehicular pollution.
5. Measurement of SO_x and NO_x using High Volume Air Samplers for 24 hour averaging period.
6. Measurement of Sound Pressure Levels at commercial area.
7. Measurement of SO_x and NO_x using High Volume Air Samplers for 8 hour averaging period.
8. Measurement of Sound Pressure Levels at industrial area.
9. Measurement of Sound Pressure Levels at railway stations.

Assignments:

1. Air Pollution: Sources and effects on human, vegetation, animals, and materials
2. Assignments and numerical based on Wind Rose Diagram
3. Assignments and numerical based on Maximum Mixing Depth (MMD)
4. Assignments and numerical based on dispersion of Pollutants in the atmosphere
5. Assignments and numerical based on Noise Pollution
6. Assignments based on odour and control

Design based Problems (DP)/Open Ended Problem:

The students will be given seminars and literature based projects on relevant topics.

Major Equipment:

1. High volume air sampler.
2. PM 10 and PM 2.5 sampler.
3. Stack monitoring kit

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should be submitted to Swarnim Startup & Innovation University.

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SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ENVIRONMENTAL ENGINEERING

ENVIRONMENTAL RESOURCES

SUBJECT CODE: 2410604

B.E. 6TH SEMESTER

Type of course: Basic sciences

Prerequisite: Basics of Environmental studies

Rationale: To make students aware regarding finite environmental resources.

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	-
3	2	0	5	4	30	20	70	30	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Water Resources:** Global water distribution, Assessment of water resources, Water budget of India, water requirements: Domestic, Agriculture, Industry, water usesand consumption, water scarcity, water management & sustainable water use in India, water conservation in industry, agriculture and homes, Rain water harvesting. Desalination of sea water Recycling & Reuse of wastewater.	04	10
2	**Food Resources:** Sources of food, measures of food availability, limits to food production, food production & environment, -agriculture: Environmental impacts, -Domesticated animals, -Aqua culture.	02	4

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3	**Energy Resources:** Energy Basics, Energy Scenario for Renewable & Non-renewable energy resources: Global & India, Non Renewable resources: Estimation of stock and reserves : Static Reserve Index, Exponential Reserve Index, Conventional Fossil fuels: Coal, Oil and Natural gas , Nuclear fuels, Alternative Energy sources: How it works and citing criteria, Solar Energy: Solar Cell and Solar Panel, Hydro power, Tidal energy, Wind energy, Geothermal energy, prospects and potential of different alternative energy sources.	08	19
4	**Forests and Wildlife:** Types of forest, importance of forest, deforestation, desertification, causes and consequences, social forestry.	06	14
5	**Biodiversity:** Importance of biodiversity, decline of biodiversity, reasons of the decline, consequences of losing biodiversity, steps to protect biodiversity.	04	10
6	**Population: Population theories:** Malthusian theory, Optimum Theory, Demographic transition Theory, Population dynamics: instantaneous rate of increase, basic equation of population dynamics, growth rate equation, the exponential growth (application & properties), Doubling time: concept & application, Population forecasting, Demographic projections & population structure (world & India): population profiles, age structure diagrams, Populationexplosions: causes & consequences, Remedial measures.	10	23
7	**Environmental Ethics and Politics:** Pollution control policies, GNP and Quality of Life, Science-technology& laws, Global commons- tragedy of the commons, Feeding the rich & over consumerism, Environment & ethics. , Environmental Movements (National and International.	04	10
8	**Global warming and Climate change:** Role of CO_2, Methane, Nitrous oxide, and Chlorofluorocarbons in climate change, Carbon footprint, CDM.	04	10

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Reference Books:

1. Eco science, Population, Resources and Environment by Ehrlich and Ehrlich(W.H. Freeman & Company San Fransico1977)
2. Essentials of Environment by Gilbert Master (3^{rd} Edition- Prentice hall, NewJersey)
3. Basics of Environmental Studies by Prof. Dr. N.S. Varandani (Books IndiaPublication)

Course Outcome:

After learning the course the students should be able to:

1. Discuss the concern and appreciate importance of depletion of resources and their sustainability.
2. Organize and use environmental resources optimally and in sustainable manner.
3. Disseminates learnt information related to the Subject orally and in written form throughpresentation and reports.
4. Forecast the population using different population forecasting formula and apply the population theories.

List of Tutorials:

1. Tutorials based on water and food resources.
2. Assignment on Energy resources.
3. Definition of terms and questions based on forest and wild life.
4. Assignment on population theories and numerical on population forecasting.
5. Definition of terms relating to environmental ethics.
6. Assignment based on global problems.

Active Learning Assignments (ALA): Preparation of power-point slides: which may include videos, animations, pictures, graphics for better understanding of theory and practical work. The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus can be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submitted to Swarnim Startup & Innovation University.

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SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ENVIRONMENTAL ENGINEERING

GROUND WATER CONTAMINATION

SUBJECT CODE: 2410605

B.E. 6TH SEMESTER

Type of course: Applied Science

Prerequisite: --

Rationale: To learn the principles and theories regarding ground water contamination

Teaching and Examination Scheme:

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	-
3	2	0	5	4	30	20	70	30	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction:** Definition of ground water, aquifers, vertical distribution of sub surface water, hydrological properties of water bearing strata, ground water in hydrologic cycle.	04	10
2	**Ground water hydraulics:** Darcy's law, its range of validity, Dupuit's assumptions, Applications of Darcy's law for simple flow systems, Governing differential equations for confined and unconfined aquifers, steady and unsteady flow solutions for fully penetrating wells, partially penetrating wells, interference of wells, test pumping analysis with steady and unsteady flows, delayed yield, method of images.	14	33

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3	**Ground water quality :** Indian and international standards.	02	04
4	**Ground water pollution :** Sources, remedial and preventive measures.	04	10
5	**Ground water conservation:** Ground water budget, seepage from surface water, artificial recharge.	04	10
6	**Models for ground water flow:** Sampling and monitoring methods , transport mechanisms, modelling Advective-Dispersive transport, Adsorption and chemical reaction, biodegradation kinetics, numerical flow and transport modelling, waste site characterization/investigation, ground water remediation, legal issues in ground water contamination.	14	33

Reference Books:

1. Ground Water : by Raghunath
2. Ground Water Hydrology: By D K Todd
3. Groundwater Resources Education by W C Walton
4. Numerical Ground Water Hydrology by Roger Diewest.
5. Ground water hydrology and contamination by Nicholas Cheremenisoff

Course Outcome:

After learning the course the students should be able to:

1. Apply the laws of ground water hydraulics and solve the differential equations for different types ofaquifers.
2. Identify the sources of ground water contamination and suggest the remedial and preventivemeasures to overcome ground water contamination.
3. Decide the mechanisms for ground water conservation.
4. Use the models for ground water flow and apply them for minimization/prevention of ground watercontamination and its transport.

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List of Exercises: Term work will comprise of assignments on the questions related to definition of terms used in ground water hydrology, ground water contamination and methods of treatment of contaminated groundwater.

Design based Problems (DP)/Open Ended Problem: Numericals based on Darcy's law, Dupuit law foryield.

List of Open Source Software/learning website: http://nptel.ac.in/

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should be submitted to Swarnim Startup & Innovation University.

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SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGG.

REFRIGERATION AND AIRCONDITIONING
CODE:
B.E. 6TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	-	70	-	150

Objective: -

- Learning the fundamental principles and different methods of refrigeration and air conditioning.
- Study of various refrigeration cycles and evaluate performance using Mollier charts and/ or refrigerant property tables.
- Comparative study of different refrigerants with respect to properties, applications and environmental issues.
- Understand the basic air conditioning processes on psychometric charts, calculate cooling load for its applications in comfort and industrial air conditioning.
- Study of the various equipment-operating principles, operating and safety controls employed in refrigeration air conditioning systems

Prerequisites: - Thermodynamics.

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Unit 1: Fundamentals and Applications of Refrigeration and Air Conditioning** **Fundamentals** Reverse Carnot cycle, block diagram of refrigerator & heat pump (numerical), modified reverse Carnot cycle (Bell Coleman cycle) **Applications** Domestic Refrigerator, Domestic Air Conditioners, Automotive Air Conditioners, Evaporative coolers, water coolers, Commercial Refrigeration- Dairy, Cold storage, Ice plant, Commercial Air Conditioning- Multiplex, Hospitals.	08
2	**Unit 2: Refrigerants and Vapour Compression Cycle** **Refrigerants** Classification, nomenclature, desirable properties, secondary refrigerants, future industrial refrigerants **Vapour Compression Cycle**	09

	Simple system on P-h and T-s diagrams, analysis of the simple cycle, factors affecting the performance of the cycle, actual cycle **Compound Compression System:** Compound compression with intercooler, flash gas removal and flash intercooler, multiple evaporators with back pressure valves and with multiple expansion valves without flash inter cooling, analysis of two evaporators with flash intercooler and individual expansion valve and multiple expansion valve, cascade refrigeration system	
3	**Unit 3: Refrigeration Systems** **Vapour absorption systems** Introduction, Working of simple vapour absorption system (VAS), desirable properties of binary mixture (aqua-ammonia), performance evaluation of simple VAS (simple numerical treatment), actual VAS, Li- Br absorption system, three fluid system (Electrolux refrigeration), applications of VAS, comparison between VCC and VAC.	08/20+
4	**Unit 4: Psychometric and Air conditioning** **Psychrometry:** Dalton's law of partial pressure, Properties of moist air, temperature and humidity measuring instruments, psychrometric chart, psychrometric processes such as sensible heating and cooling, heating and humidification cooling and dehumidification, chemical dehumidification, adiabatic saturation **Human comfort:** Selection of inside design conditions, thermal comfort, heat balance equation for a human being, factors affecting thermal comfort, Effective temperature, comfort chart and factors governing effective temperature, selection of outside design conditions	08/20+
5	**Unit 5: Air Distribution Systems** Air handling unit, Classification of ducts, duct material, pressure in ducts, flow through duct, pressure losses in duct (friction losses, dynamic losses), air flow through simple duct system, equivalent diameter, methods of duct system design: equal friction, velocity reduction, static regain method (numerical on duct system design) Fan coil unit, types of fans used air conditioning applications, fan laws, filters, supply and return grills, sensors (humidity, temperature, smoke).	08/15+
6	**Unit 6: Air-conditioning systems** Classification, system components, all air; all water; and air-water systems, room air conditioners, packaged air conditioning plant, central air conditioning systems, split air conditioning systems	03/05+

Learning Outcomes: - After learning the course the students should be able to

- Illustrate the fundamental principles and applications of refrigeration and air conditioning system
- Obtain cooling capacity and coefficient of performance by conducting test on vapor compression refrigeration systems
- Present the properties, applications and environmental issues of different refrigerants
- Calculate cooling load for air conditioning systems used for various applications
- Operate and analyze the refrigeration and air conditioning systems.

Teaching & Learning Methodology:-

It is theoretical subject with application of mathematics. So following teaching methodology should be appropriate.

Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered.

Books Recommended:

- Refrigeration and Air Conditioning by C P Arora, McGraw-Hill India Publishing Ltd.
- Refrigeration and Air-conditioning by Ramesh Arora , Prentice Hall of India
- Refrigeration and Air Conditioning by Manohar Prasad, New Age International Publisher
- Principles of Refrigeration by Roy. J Dossat, Pearson Education
- Refrigeration and Air Conditioning by Jordon and Prister, Prentice Hall of India Pvt. Ltd.
- Refrigeration and Air Conditioning by W.F. Stocker and J. W. Jones, McGraw-Hill
- Refrigeration and Air Conditioning by Ameen Ahmadul, PHI India

List of Open Source Software/learning website:
1. http://nptel.ac.in/

List of laboratory experiments:

1. To understand different components of VCR system and to determine its COP
2. To understand working of Electrolux refrigerator and to determine its COP.
3. To understand construction and working of reciprocating, rotary and centrifugal compressor used for R&AC.
4. To understand various tools used for refrigeration tubing and and to perform various operations like flaring, swaging, bending, brazing etc.
5. To perform different psychrometric processes and analyze the same using psychrometric chart.
6. To understand construction and working of window air-conditioner/ split air-conditioner and to determine its capacity.
7. To determine COP and apparatus dew point of an air conditioning test rig.
8. To calculate cooling load of a confined space using table and compare the same with load estimation sheet.
9. Study of domestic refrigerator and to determine % running time at different thermostat settings.
10. To determine (COP)C and (COP)H of heat pump
11. To determine saturation efficiency of air cooler/air washer
12. Study of packaged plant

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGG.
PRODUCTION TECHNOLOGY
CODE:
B.E. 6TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	0	2	5	4	30	50	70	~~30~~	150

Objective: -

Students will be able to apply basics of metal machining processes very well. They can have enough knowledge of different forces acting while cutting with tool life and wear. They can interpret and utilize the economics of machining. Learns the technology of Gear and threads manufacturing which is grassroots knowledge of any manufacturing industries. They are able understand the usefulness of Jig & Fixtures, Presses & Press work, Types of Dies and various forces acting during cutting. They also understand

Prerequisites: -Manufacturing Engineering 1

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Metal Cutting:** Principles of metal cutting, classification of Metal cutting/machining processes: Orthogonal and oblique cutting, Effect of tool geometry and other cutting parameters, Mechanisms of formation of chips, types of chips formed, chip Breakers, concept of specific cutting pressure, The forces acting on the cutting tool and their measurement, Merchant's circle diagram, force dynamometer, force and velocity relationship, Tool wear, Factors causing wear, tool life, variables affecting tool life, economical cutting speed, machinability of metals.	10
2	**Thermal Aspects in Machining:** Sources of heat generation in machining and its effects, Temperature Measurement techniques in machining, types of cutting fluids, Functions of cutting fluid, Characteristics of cutting fluid, Application of cutting fluids, Economics of Metal Cutting Operations.	05
3	**Gear and Thread Manufacturing:** Different types of Threads manufacturing methods, and tools involved, Different gear forming and generating methods with their special features, Gears finishing processes.	05
4	**Jigs and Fixtures:** Definition, Differences between Jigs and Fixtures, Its usefulness in mass production, design principles, 3-2-1 location principle and its application to short and long cylinders, types of locators, concept of work piece control, geo metric control,	06

	dimensional control and mechanical control, Clamps, jig bushes, Jigs and fixtures for various machining operations.	
5	**Press Tool:** Classification of presses, Classification of dies, cuttingactions in dies, clearance, cutting forces, Methods of reducingcutting forces, Minimum Diameter of Piercing Center of Pressure,Blanking, Piercing, Drawing, Bending and Progressive Die design,scrap reduction, strip layout.	09
6	**Non-conventional Machining:** EDM, IBM, ECM, ECG, CM,AJM, Wire cut EDM, USM, LBM process principle, processparameters and their applications. Process capabilities and theirapplications.	12

Learning Outcomes: -

1. Students will be able to apply basics of metal machining processes very well with the detailed signature of tools.
2. Students able to understand different forces acting while metal cutting and can draw merchant circle diagram and also able to apply knowledge to economic metal cutting.
3. Students can able to grasp distinctive knowledge of gear forming and its generating methods.
4. Students are able to clutch its usefulness and design of such locating and fixing devises.
5. Learn in depth about press and press work
6. Gained elementary knowledge in Non-conventional machining and its application in industries.

Teaching & Learning Methodology:-

The course content should be taught and implemented with the aim to develop required skills in the students so that they are able to acquire following competencies. Develop the ability to select and/or design cutting tools, tool holders, dies, jigs and fixture for given simple component.

Books Recommended:

1. Metal Cutting principles, by M C Shaw, Oxford University press
2. Fundamentals of machining and machine tools, by Boothroyd - CRC publication
3. Production Technology - H.M.T. By HMT
4. Tool Design by Donaldson, Tata McGraw Hill Pub.
5. Metal cutting Principles by Trent McGraw Hill Pub
6. Workshop Technology Vol. II by Raghuvanshi, Dhanpatrai Pub
7. Production Technology by R.K. Jain, Khanna Pub

List of Open Source Software/learning website:

1) http://www.psgdesigndata.org
2) http://www.carrlane.com
3) http://www.nptel.ac.in

Practical List:-

1. Determination of chip-thickness ratio and shear plane Angle During Machining
2. Measurement of cutting forces in turning using Lathe Tool Dynamometer under various cutting conditions
3. To study the Temperature Measurement on chip tool interface
4. To study and understand the effect of a suitable cutting lubricant
5. Design a Jig and Fixture for given component
6. To study different press and design of punch and die, also exercise on strip layout and center of pressure
7. Study of Unconventional Manufacturing Process and simple exercise on metal removal rate.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING
INTERNAL COMBUSTION ENGINES
CODE: _____
B.E. 6TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	—	150

Objective: - On completion of this course, the students are expected to understand the concept of working principles of SI and CI Engines, lubrication, cooling system, super charging and scavenging systems.

Prerequisites: - Basics of Elements of Mechanical Engineering.

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**ENGINE CONSTRUCTION AND OPERATION:** Four stroke SI and CI engines - Working principle - function, materials, constructional details of engine components - Valve and port timing diagram - Firing order and its significance - relative merits and demerits of SI and CI engines Two stroke engine construction and operation. Comparison of four-stroke and two-stroke engine operation.	4 10%
2	**FUEL AIR CYLCLE, ACTUAL CYCLE AND THEIR ANALYSIS** Factors comparison of air standard and fuel air cycles, effect of operating variables on cycle analysis, difference between actual cycle and fuel cycle for SI and CI engines, Reason for variation of specific heats, Effect of specific heat on air standard cycle of otto and diesel cycles	6 15%
3	**FUELS AND ITS SUPPLY SYSTEM FOR SI AND CI ENGINE:** Important qualities of IC engine fuels, rating of fuels, Carburetion, mixture requirement for different loads and speeds, simple carburetor and its working, types of carburetors, MPFI, types of injection systems in CI engine, fuel pumps and injectors, types of nozzles, spray formation	8 15%
4	**COMBUSTION IN SI AND CI ENGINES:** Stages of combustion in SI engines, abnormal combustion and knocking in SI engines, factors affecting knocking, effects of knocking, control of knocking, combustion chambers for SI engines, Stages of combustion in CI engines, detonation in C.I. engines, factors affecting detonation, controlling detonation	12 20%

5	**IGNITION SYSTEM, & SUPERCHARGING SYSTEM** Battery and magneto ignition system, spark plug, firing order, Need for supercharging, Effect of supercharging, types of supercharger, methods of supercharging	5 15%
6	**ENGINE LUBRICATION AND COOLING:** Lubrication of engine components, Lubrication system – wet sump and dry sump, crankcase ventilation, Types of cooling systems – liquid and air cooled, comparison of liquid and air cooled systems,	5 15%
7	**ENGINE EMISSION AND THEIR CONTROL:** Air pollution due to IC engines, Euro I to VI norms, HC, CO and NOx emission, catalytic convertor, DPF, SCR	5 10%

Learning Outcomes: - At the end of the course, student will be able to

- Understand various components of the engine and its functions.
- Understand the combustion in SI Engine
- Gain knowledge on combustion in CI Engine
- Understand the lubrication and cooling system in IC Engines.
- Understand the turbo, supercharging and scavenging system in IC Engines

Teaching & Learning Methodology:-

1. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & indicated weightage should be given to all topics while teaching and conduction of all examinations.
2. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
3. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and it will carries five marks in the overall internal evaluation.

Books Recommended:

1. Ganesan, V, Internal Combustion Engines, Tata McGraw Hill Book Co., 2003.
2. Rajput R.K. Internal Combustion Engines, Laxmi Publications (P) Ltd, 2006.
3. John B. Heywood, Internal Combustion Engine Fundamentals, McGraw Hill Book, 1998.
4. B.P. Pundir Engine Combustion and Emission, 2011, Narosa Publishing House.
5. Mathur, M.L., and Sharma, R.P., A Course in Internal Combustion Engines, Dhanpat Rai Publications Pvt. New Delhi-2, 1993.
6. Willard W. Pulkrabek, Engineering Fundamentals of the Internal Combustion Engines, 2007, Second Edition, Pearson Prentice Hall

List of Open Source Software/learning website:

https://onlinecourses.nptel.ac.in/noc19_me10/preview

https://ocw.mit.edu/courses/mechanical-engineering/2-61-internal-combustion-engines-spring-2017/

Practical List:-

1. Determination of valve timings for four stroke Petrol/Diesel Engine.
2. Study about ignition and governing system of I C engines.
3. Study about supercharging and turbo charging of I C engines.
4. Study about various methods for measurements and testing of I C engines.
5. Study about engine emissions and their control.
6. Performance test of 4 stroke Petrol Engine.

7. Performance test of 4 stroke Diesel Engine.

Major Equipment:

1. 4-stroke Petrol engine
2. 4-stroke Diesel engine
3. Cross-section/working model o engine
4. VCR (Variable Compression Ratio) engine

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING

DEPARTMENT OF MECHANICAL ENGG.

FLUID POWER ENGINEERING
CODE:
B.E. 6TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	4	4	30	50	70	—	150

Objective: -

- Different applications of Pumps & Compressors.
- Different types of Pumps & Compressors.
- How to design Pumps & Compressors.

Prerequisites: - Elements of Mechanical Engineering.

Course outline: -

Sr. No.	Course Contents	No. of Hours / % weightage
1	**Unit I: Hydropower Plant:** Introduction, Major applications of hydropower plant, Classification of hydropower plant, Essential components of hydropower plant, Advantages and disadvantages of hydropower plant, selection of site for a hydropower plant	02/10%
2	**Unit II: Impact of Jet:** Introduction, Force exerted on stationary plate held normal and inclined to jet, Force exerted on curved plate, force exerted on moving plate held normal and inclined in direction of moving jet, Force on a plate when vane is moving in direction of jet, jet striking on curved vane tangentially at one tip and leaving at other end, jet propulsion in ships	07/20%
3	**Unit III: Hydraulic Turbines:** Introduction, Classification of turbines, Impulse and reaction turbines, construction, working and performance of Pelton, Francis and Kaplan Turbines, Draft tube, Governing of hydraulic turbines, Cavitations	07/20%
4	**Unit IV: Centrifugal Pumps:** Pump classification and selection criterion, Centrifugal pumps, Velocity vector diagrams, Pump losses and efficiencies, Net positive suction head, Pressure rise in impeller, Characteristic curves of centrifugal pumps, priming, maximum suction limit - minimum starting speed to deliver the discharge, Multistage pumps, cavitation, pump selection	06/20%
5	**Unit V: Reciprocating Pumps** Introduction: Types, Component and Working of Reciprocating pump, Discharge,	08/10%

	Work done and power required to drive for single acting and double acting, Coefficient of discharge, slip, Effect of acceleration of piston on velocity and pressure, indicator diagram, Air Vessel, Operating characteristics.	
6	**Unit VI: Design of Compressors** Basic theory, classification and application, Working with enthalpy-entropy diagram, construction and approximate calculation of centrifugal compressors, impeller flow losses, slip factor, diffuser analysis, performance curves of centrifugal compressors, Basic design features of axial flow compressors; velocity triangles, enthalpy-entropy diagrams, stage losses and efficiency, work done factor, simple stage of axial flow compressors.	08/20

Learning Outcomes: - After learning the course the students should be able to

1. Learn the benefits and limitations of fluid power compared with other power transmission technologies.
2. Understand the operation and use of different hydraulic machines like hydraulic crane, fluid coupling and fluid torque convertor etc.
3. Formulate and analyze models of hydraulic components.
4. Design and predict the performance of fluid power components

Teaching & Learning Methodology:-

It is theoretical subject with application of mathematics. So following teaching methodology should be appropriate.

Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered.

Books Recommended:

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, S.K. Kataria & Sons.
2. Shepherd, D.G., —Principles of Turbomachinery—, Macmillan, 1969.
3. John Tuzson, —Centrifugal Pump Design,— John Wiley
4. Stepanff, A.J., "Blowers and Pumps ", John Wiley and Sons Inc., 196
5. Austin H. Chruch, —Centrifugal pumps and blowers—, John Wiley and Sons, 1980.
6. Val S.Labanoff and Robert Ross, —Centrifugal Pumps Design and Applications— Jaico P House.
7. Igori Karassik, —Pump Hand Book,— McGraw-Hill International Edition.
8. G.K.Sahu —Pumps— New age international publishers.

List of Open Source Software/learning website:

1. http://nptel.ac.in/
2. http://www.nfpa.com/

List of laboratory experiments:

1. To study about hydropower plant.
2. To Verify Impulse-momentum principle for impact of jet on stationary vane.
3. Performance test on Pelton turbine.
4. Performance test on Kaplan turbine.
5. Performance test on Francis turbine.

6. Performance test on Centrifugal pump.
7. Performance test on Reciprocating pump.

8. Performance test on Reciprocating compressor.
9. To study the constructional details of axial flow compressor and draw its characteristics curve.
10. Performance test on Centrifugal compressor.
11. Performance test on Hydraulic ram.
12. To study about hydraulic machines.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING
INDUSTRIAL ENGINEERING
CODE:
B.E. 6TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
2	-	-	2	2	30	-	70	-	100

Objective: - Industrial Engineering course is to prepare students to understand different aspects like: Plant location and Its selection, Plant layout within the plant. It also helps to understand and apply different concept of production planning and control. Study of productivity and Work-study are important tools, after studying it student are able to apply it in the industry for productivity improvement. This course gives idea about how to prepare job plan, and also gives knowledge of industrial legislation. Finally it provides knowledge about quality and entrepreneurship.

Prerequisites: - Nil

Course outline: -

Sr. No.	Course Contents	No. of Hours / % Weightage
1	**Location Selection and Plant Layout:** Nature of Location Decision, Importance of Plant Location, Dynamic Nature of Plant Location, Choice of site for selection, Comparison of location, Principles of Plant layout and Types, factors affecting layout, methods, factors governing flow pattern, travel chart, analytical tools of plant layout, layout of manufacturing shop floor, repair shop, services sectors and process plant. Quantitative methods of Plant layout: CRAFT and CORELAP, Relationship diagrams.	06 / 20 %
2	**Production Planning and Control:** Types of Production systems and their Characteristics, functions and objectives of Production Planning and Control, Sales forecasting: Techniques and Applications, Steps of Production Planning and Control: Process planning, Leading, Scheduling, Dispatching and Expediting with illustrative examples, Introduction to line of balance, assembly line balancing and progress control.	06 / 20 %
3	**Productivity and Work Study:** Definition of productivity, application and advantages of productivity	05 / 15 %

	improvement tools, reasons for increase and decreases in productivity. Areas of application of work study in industry. Reaction of management and labour to work study. Method Study: Objectives and procedure for methods analysis, Recording techniques, Operations Process Chart, Flow Process Chart, Man-Machine , Multiple Activity Chart, Travel Chart, and Two Handed process chart, String Diagram, Therbligs, Micro motion and macro-motion study: Principles of motion economy, Normal work areas and work place design. Work Measurement: Objectives, Work measurement techniques – time study, work sampling, pre-determined motion time standards (PMTS) Determination of time standards. Observed time, basic time, normal time, rating factors, allowances, and standard time. Introduction to ergonomics.	
4	**Job Evaluation and Wage Plan:** Objective, Methods of job evaluation, job evaluation procedure, merit rating (Performance appraisal), method of merit rating, wage and wage incentive Plans.	03/10-1.
5	**Industrial Legislation:** Need for Industrial legislation, Factories act 1948, Industrial dispute act 1947,The Indian trade unions act 1926, Industrial employment act 1946, Payment of wage act 1936, Workmen compensation act 1923, Payment of bonus act 1965, Employees provident fund scheme 1952.	03/10-1.
6	**Inspection and Statistical Quality Control:** Inspection – functions, types, objectives and benefits, quality control principles, Concepts of quality circles, Total quality management, Quality assurance, Quality audit, Basic Concept ISO 9000, ISO 14000 and QS 9000, Six sigma: Concept, Principle, Methodology, Scope, Advantage and limitations. SQC Concept, variable and attributes, normal distribution curves and its property charts for variable and attributes and their applications and interpretation (analysis) process capability. Acceptance sampling, sampling plans, OC curves and AOQ curves.	05/15-1.
7	**Entreprencurship:** Concept, product identification, infrastructure facilities, preparation of project report, sources of industrial finance, Resources allocation, Government incentives to entrepreneurs.	02/10-1.

Teaching Outcome:

After learning the course the students should be able to:

1. Demonstrate location decision and site selection
2. Use of plant layout knowledge for betterment of plant
3. Use of Production planning and control
4. Solve forecasting problem by applying different techniques
5. Understanding planning, scheduling and sequencing problems for shop floor
6. Demonstrate assembly line balancing and dispatching
7. Apply work study techniques and understands its importance for better productivity
8. Demonstrate wage and incentive plans
9. Acquire knowledge of industrial legislation
10. Apply statistical quality control techniques for inspection
11. Learn about entrepreneurship to become entrepreneur

Reference Books:

1. Manufacturing Organisation and Management, Harold Amrine, John Ritchey, Moodie, Kmec, 6ht Ed., Pearson
2. Production System, Planning, Analysis and Control – By J.L. Riggs 3rd ed. Wiley
3. Production and Operations Management – By R. Panneerselvam, PHI Private Ltd.,
4. Industrial Engineering and Production Management Martand Telsang S Chand & company.
5. Industrial Engineering and Production Management by Banga and Sharma, Khanna Publishers.
6. Industrial Engineering and Management by Dr. B. Kumar Khanna Publishers
7. Work study by International Labour Organisation, ILO

List of Open Source Software/learning website: http. http://nptel.ac.in/courses/112106138

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGG.
DYNAMICS OF MACHINERY
CODE:
B.E. 6TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	—	150

Objective: The course aims to introduce fundamentals of forces induced due and responsible for the the motion of parts of mechanism / machine. This forces most of the time are unwanted and may cause adverse effect on the function of the mechanism or machine. Hence, the techniques to determine them and counter them are required to be learned

Prerequisites: - Kinematics of Machine, Theory of Machine.

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Balancing of Rotating Masses:** Concept of static and dynamic balancing, Analysis of effect of unbalanced masses in single and multiple planes in rotating elements, Bearing reactions. Approaches and equipment for measurement of unbalanced masses. **Dynamics of Reciprocating Engines:** Single Cylinder Engine: Kinematics of kinematics (Analytical), Gas force and torque; static and dynamic equivalence of models (for masses); Inertia, shaking force and shaking torque, Analysis of pin forces, balancing. Multi Cylinder Engines: Configurations; Inline Engines: Effect of phase angles, firing order and number of strokes; Shaking forces and moments, inertia torques and determination best configuration / unbalanced mass. Analysis of V and radial engine configurations. Graphical methods may be demonstrated but emphasis should be on analytical approach.	08
2	**Free Vibration:** Basic features of vibratory systems – Degrees of freedom – single degree of freedom – Free vibration– Equations of motion – Natural frequency – Types of Damping – Damped vibration– Torsional vibration of shaft – Critical speeds of shafts – Torsional vibration	08
3	**Forced Vibration :** Response of one degree freedom systems to periodic forcing – Harmonic disturbances – Disturbance caused by unbalance – Support motion – transmissibility – Vibration isolation vibration measurement	08

4	**Torsional Vibration :** **Two Degrees of Freedom System:** Equation of motion and principal mode of vibration, torsional vibrations of two and three rotor system, torsionally equivalent shaft, geared system. **Multi degree freedom systems and analysis (Free vibrations):** Concepts of normal mode vibrations, natural frequencies, mode shapes, nodes, Correct definition of natural frequency.	06
5	**Vibration Measurement:** Introduction to vibration measurement and analysis devices: Vibrometer, velocity pickup, accelerometer, FFT analyser	06
6	**Rotating unbalance:** Application of Dunkerley's method and Rayleigh's method for estimating the critical speed of shafts.	06
7	**Cam Dynamics:** Dynamic analysis of force-closed cam follower: Undamped and Damped response, Jump phenomenon: concept, effect of spring force and dead weights.	04

Reference Books:

1. S S Rao, Mechanical Vibrations, Pearson.
2. R L Norton, Kinematics and Dynamics of Machinery, McGraw-Hill.
3. J.Uicker , Gordon R Penstock & J.E. Shigley, Theory of Machines and Mechanisms, Oxford.
4. Kenneth J Waldron , Gary L Kinzel, Kinematics, Dynamics and Design of Machinery, Wiley.
5. R L Norton, Design of Machinery, McGraw-Hill.

Course Outcome:

After learning the course the students should be able to:

1. Determine unbalanced forces and bearing reactions for a system of rotating masses.
2. Determine unbalanced forces in reciprocating engines.
3. Determine natural frequency of mechanical systems represented in lumped form.
4. Determine critical speed shafts with unbalanced rotors and cam-follower system (to avoid jump).

List of Experiments:

1. Understand and verify the fundamental laws of static & dynamic balancing.
2. Study balancing of reciprocating masses.
3. Study and confirm relation between the period of oscillation and length of pendulum for simple and compound pendulums.
4. Study longitudinal vibrations of spring mass system.
5. To study the undamped free vibration of equivalent spring mass system.
6. To determine the time period and frequency of torsional vibrations of a single rotor system.
7. To determine the time period and frequency of torsional vibrations of two rotors system.
8. Study forced damped vibrations of single degree of freedom system.
9. To determine whirling speed of the shaft and study effect of shaft diameter and end conditions on the same.
10. Study forced lateral vibrations of a beam.
11. Vibration measurement and analysis.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGG.

& Mass

HEAT TRANSFER

CODE:

B.E. 5TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	—	150

Objective: -

- Heat transfer is the thermal energy in transit due to a spatial temperature difference. The topic of heat transfer has enormous applications in mechanical engineering, ranging from cooling of microelectronics to design of jet engines and operations of nuclear power plants.
- In this course, Students will learn about what is heat transfer, what governs the rate of heat transfer and importance of heat transfer.
  They will also learn the three major modes of heat transfer viz., conduction, convection, and radiation. In addition to these three main modes of heat transfer, students will also learn the phenomena of heat transfer during phase change (boiling and condensation heat transfer).
  The course provides practical exposure to the heat transfer equipments like, heat exchangers, heat pipes, fins, etc.

Prerequisites: - Basics of Elements of Mechanical Engineering.

Course outline: -

Sr. No.	Course Contents	No. of Hours / weightage
1	**Unit – I Conduction** **Introduction and Basic Concepts:** Application areas of heat transfer, Modes and Laws of heat transfer, Three dimensional heat conduction equation in Cartesian coordinates and its simplified equations, thermal conductivity, thermal diffusivity. **One dimensional steady state heat conduction without heat generation:** Heat conduction in plane wall, composite slab, composite cylinder, composite sphere, electrical analogy, concept of thermal resistance and conductance, three dimensional heat conduction equations in cylindrical and spherical coordinates (no derivation) and its reduction to one dimensional form, critical radius of insulation for cylinders and spheres, economic thickness of insulation.	08 / 20

2	**Unit – II Heat Generation and Transient Conduction** Heat conduction with uniform heat generation in plane wall, cylinder & sphere with different boundary conditions. **Transient heat conduction**: Validity and criteria of lumped system analysis, Biot and Fourier number, Time constant and response of thermocouple, Introduction to transient heat analysis using charts.	08/10-1.
3	**Unit – III Boundary Conditions and Extended Surfaces** **Boundary and initial conditions**: Temperature boundary condition, heat flux boundary condition, convection boundary condition, radiation boundary condition. **Heat transfer through extended surface**: Types of fins, Governing Equation for constant cross sectional area fins, solution (with derivation) for infinitely long & adequately long (with insulated end) fins and short fins (without derivation), efficiency & effectiveness of fins.	08/20-1
4	**Unit – IV Convection** **Fundamentals of convection**: Mechanism of natural and forced convection, local and average heat transfer coefficient, concept of velocity & thermal boundary layers. **Forced convection**: Dimensionless numbers and their physical significance, empirical correlations for external & internal flow for both laminar and turbulent flows. **Natural convection**: Introduction, dimensionless numbers and their physical significance, empirical correlations for natural convection.	10/20-1
5	**Unit –V Radiation** Radiation laws like Stefan Boltzmann's law, Kirchhoff's law, Wien's law, Plank's law etc. Black body, Grey body. Transmissivity, Absorptivity, Reflectivity, Emissivity of black bodies and gray bodies. Application of thermal radiation: Radiation Transfer between surfaces. Radiation through semi transparent materials..	08/10-1
6	**Unit –VI Heat Exchangers and Phase Change Phenomenon** **Heat exchangers:** Classification and applications, heat exchanger analysis – LMTD for parallel and counter flow heat exchanger, effectiveness– NTU method for parallel and counter flow heat exchanger, introduction to cross flow heat exchanger, LMTD correction factor, design criteria for heat exchanger, introduction to heat pipe. **Condensation and Boiling**: Boiling heat transfer, types of boiling, pool boiling curve and forced boiling phenomenon, condensation heat transfer, film wise and drop wise condensation (No numerical treatment).	08/20-1

mass transfer

Learning Outcomes: - After learning the course the students should be able to

1. Formulate basic equations for heat transfer problems.
2. Apply heat transfer principles to design and evaluate performance of thermal systems.
3. Calculate the effectiveness and rating of heat exchangers.
4. Calculate heat transfer by radiation between objects with simple geometries.
5. Calculate and evaluate the impact of boundary conditions on the solutions of heat transfer
6. problems.
7. Evaluate the relative contributions of different modes of heat transfer.

Teaching & Learning Methodology:-

It is theoretical subject with application of mathematics. So following teaching methodology should be appropriate.

Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered.

Books Recommended:

1. S.P. Venkatesan, Heat Transfer, Ane Books Pvt. Ltd.
2. Holman, Fundamentals of Heat and Mass Transfer, McGraw – Hill publication.
3. P.K. Nag, Heat & Mass Transfer, McGraw Hill Education Private Limited.
4. M. Thirumaleshwar, Fundamentals of Heat and Mass Transfer, Pearson Education India.
5. R.C. Sachdeva, Fundamentals of Engineering Heat and Mass Transfer, New Age Science.
6. B.K. Dutta, Heat Transfer-Principles and Applictaions, PHI.
7. C.P. Kothandaraman, S.V.Subramanyam, Heat and Mass Transfer Data Book, New Academic Science.

List of Open Source Software/learning website: http://nptel.ac.in/

List of laboratory experiments:

1. Determination of Thermal Conductivity of metal rod
2. Determination of Thermal Conductivity of insulating powder
3. Determination of Thermal Conductivity of Composite wall
4. Determination of heat transfer coefficient in Natural Convection
5. Determination of heat transfer coefficient in Forced Convection
6. Determination of temperature distribution, fin efficiency in Natural / Forced Convection
7. Determination of Emissivity of a Test surface
8. Determination of Stefan Boltzmann Constant
9. Determination of effectiveness of heat exchanger
10. Study of pool boiling phenomenon and determination of critical heat flux
11. Determination of equivalent thermal conductivity of heat pipe

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF ENGINEERING

DEPARTMENT OF AUTOMOBILE & MECHANICAL ENGG.

FLUID MECHANICS
CODE:
B.E. 5TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	5	30	50	70	—	150

Objective: -

- To understand of various properties of fluids
- To learn fluid statics and dynamics.
- To understand of Bernoulli's equation
- To Know of various applications of Bernoulli's equation

Prerequisites: - Basics of Elements of Mechanical Engineering.

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Unit I: Fundamentals of Fluid Mechanics** **Properties of Fluids:-** Definition of fluid, concept of continuum, Density, Specific Weight, Specific Gravity, Dynamic Viscosity, Kinematic Viscosity, Newton's law of viscosity, types of fluid, Rheological diagram, Surface Tension, Capillarity, Compressibility, Vapour pressure **Fluid Statics: -** Pascal's Law, Pressure at a point, Total Pressure & Centre of pressure for inclined flat plate, Buoyancy, met center and floatation.	08/20-1.
2	**Unit II: Kinematics of Fluid Motion** Eulerian and langragian approach of fluid flow, total or material derivative for velocity field, Continuity equation, types of flows (One, two, three dimensional, steady unsteady, uniform, non-uniform, laminar, turbulent, compressible, incompressible, rotational, Irrotational) . Visualization of flow field (Stream, Path and Streak line), vortices in two dimensional flow, stream function and velocity potential function	08/10-1.
3	**Unit III: Fluid Dynamics** Introduction to flow models- control volume and infinitesimally small element, Linear momentum Equation using differential Approach, Introduction to Navier – Stokes Equation,	08/20-1.

	Euler equation of motion, derivation of Bernoulli's equation along stream line , concept of HGL and THL or TEL, application of Bernoulli's equation to venture meter, Pitot tube, Submerged Orifices, Orifice meter, V-notch	
4	**Unit IV: Dimensional Analysis And Similarities** Dimension reasoning, dimensional homogeneity, dimensional analysis using Rayleigh's method, Buckingham π-theorem, significance of dimensionless, use of dimensionless numbers in experimental investigation, geometric similarity, dynamic similarity, Kinematic similarity, model testing-Model laws, Undistorted and Distorted models.	08/20-1.
5	**Unit V: Flow through Pipes** Energy losses through pipe-Major and Minor losses, Darcy-Weisbach equation, pipes in series, pipes in parallel and concept of equivalent pipe, Moody's diagram, Siphons, Transmission of power, (No derivations for minor losses) Dimensional Analysis: Dimensions of Physical Quantities, dimensional homogeneity, Buckingham π Theorem and important dimensionless numbers.	08/10-1.
6	**Unit VI: Viscous Flow:** Reynolds number and Reynolds experiment, flow of viscous fluid through circular pipe- Hagen Poiseuille formula, Flow of viscous fluid between two parallel fixed plates, power absorbed in viscous flow through - journal, foot step and collar bearing , movement of piston in dash pot, methods of measurement of viscosity. **Turbulent Flow:** Expression for coefficient of friction -Darchy Weishbach Equation, Moody diagram resistance of smooth and rough pipes shear stress and velocity distribution in turbulent flow through pipes.	08/10-1.
7	**Unit VII: Compressible Flow:** Basic equations for one dimensional compression, Pressure wave propagation, sound velocity in fluid, Mach number, Stagnation properties	03/10-1.

Learning Outcomes: - After learning the course the students should be able to

1. Understand the basic concept of fluid mechanics.
2. Understand statics, dynamics and various approaches to fluid mechanics.
3. Understand fundamentals of flow through pipes
4. Understand basics of compressible flow
5. Correlate fundamentals of fluid mechanics with various mechanical systems

Teaching & Learning Methodology:-

It is theoretical subject with application of mathematics. So following teaching methodology should be appropriate.

Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered.

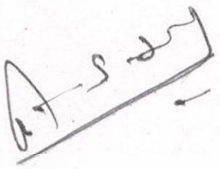
Books Recommended:

1. Fundamentals of Fluid Mechanics- Munson, Young and Okiishi- Wiley India
2. Fluid Mechanics- Potter Wiggert –Cengage Learning
3. Introduction to Fluid Mechanics- Fox, Pichard , McDonald- Wiley
4. Fluid Mechanics,- Dr. R.K. Bansal- Laxmi Publication (P) Ltd. New Delhi
5. Hydraulics and Fluid Mechanics, - Modi P. N. and Seth S. M -Standard Book House.
6. Fluid Mechanics,- Cengel&Cimbla- TATA McGraw-Hill
7. Fluid Mechanics- White- TATA McGraw-Hill

List of Open Source Software/learning website: http://nptel.ac.in/

List of laboratory experiments:

1. To understand pressure measurement procedure and related instruments/devices.
2. To determine metacentric height of floating body.
3. Verification of Bernoulli's theorem.
4. To measure the velocity of flow using Pitot tube.
5. To determine the Coefficient of discharge through different flow meters. (Any two out of Orifice meter, Venturi meter and Nozzle meter.)
6. To determine the Coefficient of discharge through open channel flow over a Notch. (Rectangular or V notch)
7. To determine the different types of flow Patterns by Reynolds's experiment.
8. To determine the Friction factor for the different pipes.
9. To determine the loss coefficients for different pipe fittings.
10. To determine the viscosity of fluid by viscometer (Redwood or Saybolt).



SWARRNIM STARTUP & INNOVATION UNIVERSITY, GANDHINAGAR

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

DESIGN OF MACHINE ELEMENTS
CODE:
B.E. 5TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	0	2	5	4	30	50	70	-	150

Objective: -

- To review concepts of statics and strength of materials.
- To introduce fundamental approaches to failure prevention of components.
- To provide knowledge in the design of common machine elements such as fasteners, shafts, springs cotter joints and couplings.

Prerequisites: - Basics of Machine elements design.

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Introduction to Design-** Definition, steps in design process, preferred numbers, standards and codes in design. **Materials and their properties-** Elastic and plastic behavior of metals, ductile and brittle behavior, shear, bending and torsional stresses, combined stresses, stress concentration factor.	08
2	**Design Against Fluctuating Loads:** Stress Concentration, Endurance limit and Fatigue failure, Factors affecting endurance limit, S-N Diagram, Design for reversed stresses and cumulative damage, Fluctuating stresses: Soderberg, Gerber, Goodman and Modified-Goodman criteria, Combined stresses.	10
3	**Pressure Vessels**: Thin cylinders and spherical vessels, Wire wound cylinders. Thick cylinders: Principal stresses in cylinder subjected to internal/external pressure, Lame's equation, Clavarion's and Bernie's equations, Autofrettage, Compounding of cylinders, Gasketted Joints, Thickness of cylindrical and spherical shells, Design of End closures, Area compensations for nozzles. Introduction to Design codes.	07

4	**Belt and Chain Drives**: Flat Belt Drive: Belt Construction, Flat Belt Drive: Length of the Belt: Open and Cross drive types, Ratio of Tensions on tight side to slack side, Condition for maximum power transmission, Creep phenomenon, Methods for tensioning, Selection of Belts from catalogues, Design of Pulley for flat belt drive. Timing belt selection. V-Belt Drive: Nomenclature, Selection of V-Belts from catalogues. Chain Drive: Nomenclature of roller chains, Length and power rating of chains, Design of chain drive.	10	20%
5	**Springs**- classification, spring materials, stresses and deflection of helical springs, axial loading, curvature effect, resilience, static and fatigue loading, surging, critical frequency, concentric springs, end construction. **Leaf springs**- Flat springs, semi elliptical laminated leaf springs, design of leaf springs, nipping	08	20%

Learning Outcomes: - After learning the course the students should be able to

i. Find out various stresses induced in a machine element under different type of loading conditions.
ii. Devise machine components for its conceptual design.

Teaching & Learning Methodology:-

It is theoretical subject with application of mathematics. So following teaching methodology should be appropriate.

1. Explaining terminology, the importance of units and dimensions, Thermodynamic concepts, basic Thermodynamics principles, mathematical representations of the basic principles, calculation techniques.
2. Classroom Communication
3. Presentation of various charts and drawings related to thermodynamics processes.
4. Interactive Learning Methods

Books Recommended:

1. Jalaludeen , Machine Design, Anuradha Publications, Chennai,2014
2. R. L. Norton, Machine Design – An Integrated Approach, Pearson Education, 2001
3. V.B.Bhandari, Design of Machine elements, McGraw Hill, 2010

References Books:

1. J. E. Shigley, Mechanical Engineering Design, McGraw Hill,2003
2. Juvinall R.C & Marshek K.M., Fundamentals of Machine Component Design, John Wiley,2003
3. M. F. Spotts, T. E. Shoup, Design of Machine Elements, Pearson Education, 2006
4. Rajendra Karwa, Machine Design, Laxmi Publications,2006

Data books permitted for reference in the final examination:

1. K. Mahadevan, K.Balaveera Reddy, Design Data Hand Book, CBS Publishers & Distributors, 2013
2. Narayanalyengar B.R & Lingaiah K, Machine Design Data Handbook, Tata McGraw Hill/Suma Publications, 1984
3. PSG Design Data, DPV Printers, Coimbatore, 2012

List of Experiments:

1. Exercise on material selection for given application.
2. Measure and compare properties of steel with different alloying elements.
3. Design of chain drive
4. Design of Pressure Vessel.
5. Design of Leaf Spring.
6. Design of springs.

List of Open Source Software/learning website:

1. www.nptel.com

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING.

CONTROL ENGINEERING

CODE:

B.E. 5TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	-	4	4	30	20	70	—	150

Objective: - To develop comprehensive knowledge and understanding of classical and modern control theory, industrial automation, and systems analysis. Control engineering is a diverse and rapidly expanding discipline which has become increasingly important in a wide range of industries.

Prerequisites: - Zeal to learn the subject

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Basic concepts of control system:** Terminology - plant, process, system, disturbances, controlled variable, manipulated variable etc., Block diagram of basic control system, application areas with examples. Classifications of control systems, Concept of superposition for linear systems with examples.	3 10%
2	**Mathematical modelling of systems:** Translational and rotational mechanical, electrical, thermal, hydraulic and pneumatic systems, Force voltage and force current analogy, Position servo mechanism. Block diagram and signal flow graph representation of physical systems along with rules, properties, comparison and limitation, Mason's gain formula	13 25%
3	**Stability:** Concept of stability, types of stability, Routh's stability criterion, special cases with numerical examples, stability of closed loop system, concept of root locus, open loop and closed loop transfer poles, step by step procedure for root loci, numerical examples	7 15%
4	**Time response analysis:** Standard test signals along with examples of their usage, steady state errors for step, ramp and parabolic inputs, analysis of first and second order systems, Transient response specifications with numerical examples, Basic control actions and two position, proportional, PI, PID and rate feedback controllers.	8 10%

5	**Hydraulic control system:** Basic elements of hydraulic circuit, Principle used in hydraulic circuit, Sources of hydraulic power, Integral, Derivative, PD & PID controller with its transfer function, Comparison between hydraulic and electrical control system.	10% 6
6	**Pneumatic control system:** Basic elements of pneumatic circuit, Difference between pneumatic and hydraulic control systems, Force balance and force distance type controllers, Nozzle-flapper amplifier, PD, PI and PID control system along with its transfer function.	15% 6
7	**State space analysis:** State space representation, state variables, state, state vector, state space, formulation of state space equations for mechanical and electrical systems, advantages over classical technique.	15% 3

Course Outcome:

1. Understand the methodology for modelling dynamic systems with concept of stability
2. Know the transfer function, signal flow graph representation of linear systems & their controlling actions
3. Understand concept of time, frequency response as well as concept of state-space models and their relation to frequency domain models
4. Control system of hydraulic and pneumatic system

Book references:

1. Modern control theory, Katsuhiko Ogata, Pearson Education International, Fifth edition.
2. Control system engineering, Norman S Nise, John Wiley & Sons, Inc., Sixth edition
3. Modern control systems, Richard C. Dorf, Robert H Bishop, Pearson Education International, Twelfth edition.
4. Automatic control systems, Farid Golnaraghi, Benjamin C Kuo, John Wiley & Sons, Inc., Nineth edition
5. J.Nagrath and M.Gopal," Control System Engineering", New Age International Publishers, 5th Edition, 2007

Design based problems (DP)/open ended problem:

1. Apply the knowledge of control systems on vibration system, fluid flow system, thermal system monitoring as an open or closed loop system.
2. Give a task to develop an open loop or closed loop control of physical system

List of Open source software/learning website:

- https://www.scilab.org
- www.simscale.com

Active learning assignments:

Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGG.

THEORY OF MACHINE

B.E. 5TH Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	---	150

Objective: - Theory of Machines is a fundamental course for Mechanical engineers to understand the working principals of any machine. This course is essential to understand the motion, transmission of the motion and the forces responsible for the motion.

Prerequisites: - Kinematic of Machine, Mechanics of Solid

Course outline: -

Sr. No.	Course Contents	No. of Hours
1	**Force Analysis :** Introduction to force analysis in mechanisms - static force analysis (four bar linkages only) - graphical methods, Dynamic force analysis – Inertia force and Inertia torque– D Alembert's principle –Dynamic Analysis in reciprocating engines – Gas forces – Inertia effect of connecting rod– Bearing loads – Crank shaft torque	08
2	**Flywheels:** Significance of flywheel, Turning moment and crank effort diagrams for reciprocating machines, coefficient of fluctuation of speed and energy, Limiting velocity of flywheel, dimension of flywheel rim, flywheel used in punching machine.	08
3	**Friction Devices: Brakes, Clutches and dynamometers:** Introduction, types of brakes, effect of braking on rear and front wheels of a four wheeler, types of dynamometers, belt transmission dynamometer, torsion dynamometer, hydraulic dynamometer, types of clutch.	16
4	**Governors:** Types of governors; force analysis of Porter and Hartnell governors. Controlling force, stability, sensitiveness, isochronism, effort and power.	10
5	**Gyroscope:** Gyroscopic couple and processional motion; Effect of gyroscopic couple on aeroplane and ship; Stability of two wheel and four wheel vehicles taking turn.	10

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. S S Rattan 4/e, Theory of Machines, McGraw-Hill.
2. J.Uicker , Gordon R Penstock & J.E. Shigley, Theory of Machines and Mechanisms, Oxford.
3. A G Ambekar, Mechanism and Machine Theory, PHI.
4. R L Norton, Kinematics and Dynamics of Machinery, McGraw-Hill.
5. Kenneth J Waldron , Gary L Kinzel, Kinematics, Dynamics and Design of Machinery, Wiley.
6. Meriam, J L and Kraige, L G, Engineering Mechanics: Dynamics, Wiley

Course Outcome:

After learning the course the students should be able to:

1. Analyse effect of gyroscopic couple on vehicles, ships and aeroplanes.
2. Design flywheels for IC engines and punching press.
3. Apply fundamentals of dynamics analysis to various mechanical systems.
4. Design and analyse clutches and brakes.
5. Perform power measurement using dynamometers.
6. Analyse governors.

List of Experiments:

1. Performance on gravity controlled governors.
2. Analysis of gyroscopic effect.
3. Performance on spring controlled governors.
4. Analysis of clutch.
5. Analysis of brakes.
6. Power measurement using dynamometers
7. Design of Flywheel for IC engine and Punch press.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Digital Image Processing **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	-	70	-	100

Course Objectives: -

1. To learn the fundamental concepts of Digital Signal Processing.
2. To explore the properties of DFT in mathematical problem solving.
3. To illustrate FFT calculations mathematically and develop FFT based DSP algorithms.
4. To introduce DSP processor for real time signal processing application

Syllabus:-

Sr. No	Course Contents	Number of Hours
1	**UNIT I:** **Introduction:** Background, Digital Image Representation, Fundamental Steps in Image Processing, Elements of a Digital Image Processing System -Digital Image Fundamentals: Elements of Visual Perception, A Simple Image Model, Sampling and Quantization, Some Basic Relationships between Pixels, Imagining Geometry. Image File Formats: BMP, TIFF and JPEG. Colour Models(RGB, HSI, YUV)	8
2	**UNIT II:** **Image Enhancement and Representation:**	8

	Spatial Domain Methods, Frequency Domain Methods, Some Simple Intensity Transformations, Histogram Processing, Image Subtraction, Image Averaging, Background- Smoothing Filters, Sharpening Filters, Lowpass Filtering, Highpass Filtering, Generation of Spatial Masks from Frequency Domain Specifications. Homomorphic Filtering, Detection of Discontinuities, Edge Linking using Hough Transform, Thresholding, Region based Segmentation, Split and Merge Technique, Image Representation and Description, Chain Code, Polygonal, Representation, Shape Number, Moments.	
3	**UNIT III:** **Image Segmentation and Binary Image Processing:** Segmentation: Mean Shift Segmentation – Active Contour Models – Geometric Deformable Models – Fuzzy Connectivity – 3D Graph Based Image Segmentation – Graph Cut Segmentation - Optimal Surface Segmentation. Shape Representation and Description: Hough Transform – Hadamard Transform - Region Identification – Contour Based and Region Based Shape Representation and Description – Shape Classes, Binary Morphological Operators, Hit-or-Miss Transformation, Boundary Extraction, Region Filling, Thinning and Thickening, Connected Component Labeling, Iterative Algorithm and Classical Algorithm.	8
4	**UNIT IV:** **Image Transform:** Introduction to the Fourier Transform, The Discrete Fourier Transform, Some Properties of the Two- Dimensional Fourier Transform Fast Fourier Transform(FFT), Discrete Hadamard Transform(DHT), Fast Hadamard Transform(FHT), Discrete Cosine Transform(DCT), Discrete Wavelet Transform(DWT), Fundamentals – Coding Redundancy, Inter-pixel Redundancy, Psych visual Redundancy, Fidelity Criteria.	8
5	**UNIT V:** **Image Restoration and Compression**: Model of Image Degradation/Restoration Process - Noise Models - Inverse Filtering – Least Mean Square Filtering - Constrained Least Mean Square Filtering. Edge Detection - Thresholding - Region Based Segmentation - Boundary Representation, Image Compression Models – The Source Encoder and Decoder, Lossless Compression Techniques: Run Length Coding, Arithmetic Coding, Huffman Coding, Differential PCM, Lossy Compression Techniques: Improved Gray Scale Quantization, Vector Quantization, JPEG, MPEG-1	8

Learning Outcomes:-

On successful completion of the course, the student will be able to:

- Get Familiarize with Basic Image Processing Techniques for Solving Real Problems.

- Implement Image Process and Analysis Algorithms.
- Design and Create Practical Solutions to A Range of Common Image Processing Problems and To Critically Assess the Results of Their Solutions, Including Shortcomings
- Demonstrate A Knowledge of a Broad Range of Fundamental Image Processing and Image Analysis Techniques and Concepts.

Recommended reference books:

1. Digital Image Processing – by R.C. Gonzalez And R.E. Woods,, 2nd Ed., Prentice Hall Of India, New Delhi.
2. M. Sonka, V. HlavacAnd R. Boyle, Image Processing Analysis And Machine Vision, Brooks/Colic, Thompson Learning, 1999.
3. Image Processing, Analysis And Machine Vision: Milan Sonka, Vaclav Hlavac, Roger Boyle (Thomson Brooks / Cole Edition).
4. Fundamentals Of Digital Image Processing: Anil K. Jain (Prentice Edition Hall Of India)

Digital Image Processing Lab

Lab Experiments

1. Turn your webcam feed into a pencil drawing wizard.
2. Counting the circles and ellipses
3. Detect a specific object using your webcam and also find the specific pattern in an image.
4. Detect the car and pedestrians in videos
5. Handwritten Digit classification – Classify the hand written digits from 0 to 9
6. Facial Recognition – Make your computer recognize you
7. Photo restoration
8. Automatic Number plate recognition
9. Blob Detection
10. Image Segmentation
11. Object Detection

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Machine Learning **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives: -

- Apply quantitative modeling and data analysis techniques to the solution of real world business problems, communicate findings, and effectively present results using data visualization techniques.
- Recognize and analyze ethical issues in business related to intellectual property, data security, integrity, and privacy.

Sr. No.	Course Contents	Number of Hours
1	**UNIT I:** **Introduction to Machine Learning:** Supervised Machine Learning, Unsupervised Machine Learning, Semi-Supervised Machine Learning, Bias Error ,Variance Error ,Bias-Variance Trade-Off, Statistical Fit ,Overfitting in Machine Learning, Underfitting in Machine Learning ,A Good Fit in Machine Learning ,How To Limit Overfitting.	8
2	**UNIT II:** **Linear Algorithms:** Linear Regression, Logistic Regression, Gradient Descent For Machine Learning, Batch Gradient Descent, Stochastic Gradient Descent, Linear Regression Using Gradient Descent, Logistic Regression by Stochastic	8

	Gradient Descent, Linear Discriminant Analysis, Representation of LDA Models, Making Predictions with LDA, Preparing Data For LDA.	
3	**UNIT III:** **Non-Linear Algorithms:** Classification and Regression Trees, Decision Trees, CART Model Representation, Naive Bayes, K-Nearest Neighbors, Learning Vector Quantization, Support Vector Machines, Maximal-Margin Classifier, Soft Margin Classifier, Support Vector Machines (Kernels), Training SVM With Gradient Descent ,Learn an SVM Model from Training Data,Make Predictions with SVM Model.	8
4	**UNIT IV:** **Data Preprocessing and Dimensionality Reduction, Clustering Analysis** Dealing with missing data ,Handling categorical data, Partitioning a dataset in training and test sets, Bringing features onto the same scale , Selecting meaningful features , Assessing feature importance with random forests, Unsupervised dimensionality reduction via principal component analysis , Supervised data compression via linear discriminant analysis , Using kernel principal component analysis for nonlinear mappings, Grouping objects by similarity using k-means ,Organizing clusters as a hierarchical tree ,Locating regions of high density via DBSCAN.	8
5	**UNIT V:** **Time Series Analysis and Forecasting:** Time Series Patterns, Horizontal Pattern, Trend Pattern, Seasonal Pattern, Forecast Accuracy,Moving Averages and Exponential Smoothing, Moving Averages, Weighted Moving Averages, Exponential Smoothing, Trend Projection, Linear Trend Regression, Holt's Linear Exponential Smoothing, Nonlinear Trend Regression, Seasonality and Trend, Seasonality Without Trend, Seasonality and Trend, Models Based on Monthly Data, Time Series Decomposition ,Calculating the Seasonal Indexes, Deseasonalizing the Time Series ,Using the Deseasonalized Time Series to Identify Trend.	8

Learning Outcomes:-

On successful completion of the course, students will be able to,

- Understand the process and components of Data Science project.
- Learn the importance of probability and statistics in Data Science
- Understand the machine learning in today's business world.
- Understands the various components of computer science being used for Data Science
- Understand the execution flow of a Data Science project

Recommended reference books:

1. Master Machine Learning Algorithms by Jason Brownlee
2. Statistics for Business and Economics by Anderson, Sweeney and Williams
3. Deeper Insights into Machine Learning by BIRMINGHAM(Packt)

Machine Learning Lab

Prerequisite: Knowledge of Python Programming

List of Experiments

Experiment-1
Product review prediction analysis for genuine ratings using ML

Experiment-2
Stock Market Analysis and Prediction using Time Series Analysis

Experiment-3
Artificial Intelligence Dietician using ML

Experiment-4
House Price prediction

Experiment-5
Online AI Shopping with E-wallet system

Experiment-6
Personality prediction using resume analysis

Experiment-7
Lung Disease Predictions Using ML

Experiment-8
Bitcoin Price Prediction

Experiment-9
To Find Air Quality Index

Experiment-10
Customer Segmentation for Banking Domain

Experiment-11
Credit Card Fraud Detection

Experiment-12
Air Passengers Classification

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Data Analytics using SQL **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objectives:

Students will be able to

1. Understand the history of SQL and the techniques to process the data
2. Learning various techniques of processing data
3. Creating directories and tables to store the data
4. Learn to apply various linux commands to load the data into the tables and process according to the requirement.

Sr. No.	Course Contents	Number of Hours
1	**Unit – I: Introduction to SQL** Introduction to Structure Query Language (SQL), SQL History & Evolution, Features of SQL, Understanding of SQL process, Benefits and Role of SQL along with different market forces, Types of SQL, SQL Standards, SQL and Networking, Centralized architecture, File Server Architecture, Client Server Architecture, Multitier Architecture, Understanding concept for OLAP and OLTP Applications, Difference between OLAP and OLTP, SQL and Database Management, Data warehouse Concept	8

2	**Unit – II: SQL Statements & Executions** Types of SQL Statement, Data Definition language, Data Control language, Data Manipulation Language, Types of execution, Direct Invocation, Embedded SQL, Module Binding, Call-level interface, Data types, Constants, Numeric Constants, String Constants, Time & date Constants, Symbolic Constants, Expressions, Built in function, Null Values, Primary and Foreign Key Concept	8
3	**Unit – III: Starting with basic SQL Syntax** Types of Tables, Create Database statement, Drop database Statement, Use statement, Create table Statement, Drop table Statement, Create index Statement, Drop index Statement, Describe Statement, Truncate Statement, Alter table Statement, Insert INTO Statement, Update table Statement, Delete table Statement, Commit Statement Create SQL Tables, Specify Column data types, Create user Defined Types, Specify Column Default Values, Alter SQL Tables, Updating Data, Using WHERE Clause, Using Logical operations, AND operations, OR operations, Deleting SQL table	8
4	**Unit – IV: Extracting Information & Manipulating Data** Select Statement, Returning only Distinct Rows, Using Aliases, Filtering Results using WHERE Clause, Logical Operations and Operator Precedence, NOT operator, BETWEEN Operator, LIKE Operator, IN Operator, Ordering Results with ORDER BY Understanding SQL Arithmetic, basic Math operations, ABS() function, POWER() function, SQRT() function, RAND() function, CEILING() function, FLOOR() function, ROUND() function, SUBSTRING() function, Case Conversion Functions, REVERSE() function, TRIM() function, LENGTH() function, SOUNDEX() function, DIFFERENCE() function, DATE() function	8
5	**Unit – V: Grouping & Multi-table Queries** Grouping Results, Summarizing and Aggregating Data, Counting results, Adding Results, Averaging Results, MAX & MIN functions, using HAVING clause with GROUP BY Statements, Implicit Versus Explicit Groups, Counting DISTICT Values Simple Joins/ Equi-Joins, Parent / child queries, Inner Joins, Multiple Joins, Cross Joins, Self Joins, Outer Joins, Right Joins, Left Joins, Full-outer Joins, Creating joins with more than two tables, Equi-Joins Versus Non-Equi Joins, Union operations	8

Course Outcome:

On successful completion of the course, students will be able to,

1. Explain SQL benefits and its syntax
2. Write SQL statements to create, update, delete database objects
3. Write SQL queries to retrieve data from tables

4. Demonstrate built-in functions to retrieve data and format

Write complex sub queries to retrieve data from multiple tables

Text Books:

1. Beginning SQL, Paul Wilton and John W. Colby, Published by: Wiley Publishing, Inc

Reference Books:

1. SQL: The Complete Reference, James R. Groff and Paul N. Weinberg, McGraw-Hill/Osborne

2. Learning SQL, ALAN Beaulieu, O'REILLY

List of Practical:

1) Library management system for availability status and issue duration
2) Develop a centralized college database of each department.
3) Online Retail Application database for registration process
4) Inventory control management for stock of materials and products
5) Hospital Management system to manage functioning of hospital setup
6) Payroll management system for calulation of momthly pay, taxes and social security of its employees.
7) SMS-baes remote server monitoring system for checking server failure issues
8) Develop a blood donation database by creating a schema, Entity-relationship (ER) diagram and attempt normalizing it
9) Create a cooking recipe portal for different categories of food
10) Buid web application that measures carbon footprints of buildings

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Sensor Technology **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objectives:

1. The main purpose of **sensors** is to collect data from the surrounding environment.
2. **Sensors**, or 'things' of the IoT system, form the front end.
3. These are connected directly or indirectly to IoT networks after signal conversion and processing.

Prerequisites:

Recommended as equivalent knowledge of Physics (electromagnetism),

Physics(mechanics),

Math (Taylor series approximation),

2nd order ordinary differential equations,

Basic Electronics i.e. some exposure to building basic circuits.

Sr. No.	Course Contents	Number of Hours
1	**Unit I:** **Science of Measurement and Instrumentation** Functional Elements of Measurement Systems. Definition, principles of sensing and transduction, Classification of transducers, Units and standards, Classification of errors Odds and uncertainty - Introduction to Calibration methods.	8

2	**Unit II:** **Resistive Transducers** The principle of operation, construction details, characteristics and application of resistance potentiometer, strain gauge and its signal conditioning circuits, RTD, LDR, thermistor, hot-wire anemometer and humidity sensor. Demonstration of RTD, Strain gauge, LDR	8
3	**Unit III:** **Inductive and Capacitive Transducers** Induction potentiometer - Variable reluctance transducers, LVDT - Variable reluctance Tachometer, Proximity transducers - Capacitive transducer and types - Capacitor microphone	8
4	**Unit IV:** **Other Transducers** A piezoelectric transducer, magnetostrictive transducer - Digital transducers - Fiber optic transducer - Hall Effect transducer - Photo electric transducer- I/P & P/I transducer. Introduction to Smart sensors and MEMS. Points to be considered for selecting a transducer.	8
5	**Unit V:** **Sensor Applications** Typical applications of sensors, Sensors in Real time industry, Selection criterial of the sensor as per the application, Application Cases: Weather monitoring system, Water monitoring system, Sensor on the Conveyor system.	8

Outcomes:-

1. After completing the course, students will have advanced knowledge on industrial communications and sensor technology, data mining and big data analysis for manufacturing systems, and security aspects of Industry.
2. Thorough knowledge on the different capabilities of industrial internet-of-things for sustainability and strategy.
3. Advanced knowledge on the different industrial communication systems and sensor technologies.
4. Advanced knowledge on the use of data mining and big data analysis for industrial applications.

5. Advanced knowledge on the concept of digital twin in manufacturing systems.
6. Thorough knowledge and understanding on the security aspects of industry.

Text Books:

1. E.A. Doebelin, "**Measurement Systems – Applications and Design**", Tata Mc Graw Hill, New York, 2012
2. John P. Bentley, "**Principles of Measurement Systems**", 4th Edition, Pearson Education, 2005
3. S. Ranganathan, "**Transducer Engineering**", Allied Publishers Pvt. Ltd.,2003

Sensor Technology Lab

LIST OF EXPERIMENTS:

1. **Basic Power Supply Circuit**
   a. Develop a Basic 5V DC Power Supply Circuit on breadboard using Discrete Electronic Components.
2. **Potential Divider Circuit**
   a. Develop a potential divider circuit with values of R1=10K & R2=10K,20K& 30K and test the output using Multimeter.
3. **Light Sensor Interfacing**
   a. Interface simple Light Intensity Sensor (LDR) with Potential Divider Circuit and test the circuit by changing the light intensity.
4. **Sound Sensor Interfacing**
   Interface Simple Capacitive Microphone with Potential Divider Circuit and test the
   a. Output by changing sound intensity.
5. **Infrared Sensor Interfacing**
   a. Interface the IR sensor (TX & RX) in Beam Mode with Potential Divider Circuit and test the output by cutting the beam.
   b. Interface the IR sensor (TX & RX) in Proximity Mode with Potential Divider Circuit and test the output by changing the distance of Reflective object in front of the sensor.
6. **Digital Sensors**
   a. Interface Float Sensor with Buzzer using Transistor and test its output.
   b. Interface Door Sensor with Buzzer using Transistor and test its output.
7. **Analog Sensors**

a. Interface the Soil Moisture Sensor with Comparator and test its Analog & Digital values by changing the Soil moisture level.

b. Interface the Liquid Level Sensor with comparator and test its Analog & Digital values by changing the level of liquid.

c. Interface LED & Sensor to the Particle Photon/Raspberry Pi for Integration with IoT Cloud

8. **Application Development**

a. Develop a small application using IR sensor for detection of any object with alert system

b. Develop a small application for providing Water to the garden using Soil moisture sensor

c. Develop a small application for Automated Water Level Controller.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Fuzzy Logic & Applications **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	-	70	-	100

Course Learning Objective:

- To Impart the Basic Concepts of Fuzzy Set Theory.
- To Understand the Applications of Fuzzy Logic in Various Fields.

Sr. No.	Course Contents	Number of Hours
1	**Unit-I:** **Introduction** Background, Uncertainty and imprecision, Statistics and random processes, Uncertainty in information, Fuzzy sets and membership, Chance versus ambiguity, Classical sets -operations on classical sets to functions, Fuzzy sets-fuzzy set operations, Properties of fuzzy sets. Sets as points in hyper cubes.Properties of fuzzy relations, Fuzzy Cartesian product and composition, Non interactive fuzzy sets, Tolerance and equivalence relations-crisp equivalence relation, Crisp tolerance relation, Fuzzy tolerance, Max-min Method, other similarity methods.	8
2	**Unit-II:** **Classical Relations And Fuzzy Relations and Membership Functions** Cartesian product, Crisp relations-cardinality of crisp relations, Operations on crisp relations, Properties of crisp relations, Compositions, Fuzzy relations-cardinality of fuzzy relations, Operations on fuzzy relations, Properties of fuzzy relations, Fuzzy Cartesian product and composition, Non interactive fuzzy sets, Tolerance and equivalence relations-crisp equivalence relation,	8

	Crisp tolerance relation, Fuzzy tolerance, Max-min Method, other similarity methods.	
3	**Unit –III:** **Fuzzy-To-Crisp Conversions, Fuzzy Arithmetic, Classical Logic and Fuzzy Logic :** Lambda- cuts for fuzzy sets, Lambda-cuts for fuzzy relations, Defuzzification methods. Extension principle-crisp functions, Mapping and relations, Functions of fuzzy sets-extension principle, Fuzzy transform (Mapping), Approximate methods of extension-vertex method, DSW algorithm, Restricted DSW algorithm, Comparisons, Fuzzy vectors. Contradictions, Equivalence and Logical Proofs, Other forms of the Implication Operation, Other forms of the Composition Operation	8
4	**Unit IV:** **Fuzzy Rule- Based Systems** Fuzzy Rule- Based Systems: Natural Language, Linguistic Hedges, Rule-Based Systems - Canonical Rule Forms, Decomposition of Compound Rules, Likelihood and Truth Qualification, Aggregation of Fuzzy Rules, Graphical Techniques of Inference.	8
5	**Unit V:** **Fuzzy Decision Making and Fuzzy Classification:** Fuzzy Synthetic Evaluation, Fuzzy Ordering, Preference and consensus, Multi objective Decision Making, Fuzzy Bayesian Decision Method, Decision Making under Fuzzy States and Fuzzy Actions. Classification Equivalence Relations - Crisp Relations, Fuzzy Relations. Cluster Analysis, Cluster Validity, c-Means Clustering - Hard c-Means (HCM), Fuzzy c-Means (FCM). Classification Metric, Hardening the Fuzzy c-Partition, Similarity Relations from Clustering**.**	8

Course Outcome:

On successful completion of the course, students will be able to,

1. Apply the concepts of random processes and fuzzy logic properties
2. Execute the concept of classical relations and fuzzy relations
3. Distinguish the concept of fuzzy arithmetic and crisp conversions
4. Explain about aggregation and rule-based systems
5. Apply decision making and fuzzy classification

Text Books:

1. Fuzzy Sets, Uncertainty And Information- G.J. Klir And T.A. Folger, Prentice Hall Of India, 1998.

2. Fuzzy Logic with Engineering Applications by T.J. Ross, Mcgraw Hill Int. Ed

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Genetic Algorithms **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	-	70	-	100

Objectives:

- Introduce the concepts of optimization techniques in highly complex computational problems with high-dimensional data.
- Discuss the concepts of genetic operators and genetic programming.

Sr. No.	Course Contents	Number of Hours
1	**Unit 1:** **Introduction to genetic algorithm** Robustness of Traditional Optimization and Search methods – Goals of optimization-GA.The 2-armed & k-armed Bandit problem. – The building Block Hypothesis. – Minimal deceptive problem. Concept of genetic algorithm: Introduction- definition and terminology-genetic operations on binary string-examples on genetic operations on binary string-the schema theorem-variants in genetic algorithm- Evolutionary strategies-Evolutionary programming.	8
2	**Unit II:** **Genetic programming and Operators:** Representation-Manipulating programs-Tuning of fuzzy set -classifier system-Holland classifier system0 Fuzzy classifier system of the Michigan type- Real coded GAs-Evolutionary Strategies. **GA operators:** Data structures – Reproduction- Roulette-wheel Selection –Mapping objective functions to fitness forum. – Fitness scaling. Coding – A Multi parameter, Mapped, Fixed – point coding – Discretization – constraints.	8

3	**Unit III:** **Canonical Evolutionary Algorithms:** Introduction-Evolution Strategies-Genetic Algorithms-Unified View of Simple EAs: Population Size-Selection-Reproductive Mechanisms Evolutionary Algorithms as Problem Solvers: Constrained Optimization-Evolutionary Computation Theory: Analysing EA Dynamics-overlapping and non-overlapping GA models-Self-adapting EAs- Summary.	8
4	**Unit IV:** **Applications of GA:** The rise of GA – GA application of Historical Interaction. – Dejung& Function optimization – Current applications of GA -Advanced operators & techniques in genetic search: Dominance, Diploidy& abeyance – Inversion & other reordering operators. – other mine-operators – Niche & Speciation – Multi objective optimization – Knowledge-Based Techniques. – GA & parallel processes – Real life problem.	8
5	**Unit V:** **Genetics-based machine learning:** Genetics – Based Machine learning – Classifier system – Rule & Message system –Apportionment of credit: The bucket brigade – Genetic Algorithm – A simple classifier system in Pascal. – Results using the simple classifier system. The Rise of GBMC – Development of CS-1, the first classifier system. – Smitch's Poker player. – Other Early GBMC efforts. –Current Applications.	8

Outcomes:

1. Identify the basic genetic algorithms.
2. Explain optimization techniques.
3. Summarize evolutionary algorithms.
4. Examine genetic algorithms to determine the suitable one to solve specific problems.
5. Apply the classifier system in pascal

Text Books:

1. David E. Gold Berg, "Genetic Algorithms in Search, Optimization & Machine Learning", Pearson Education, 2001
2. S.Rajasekaran, G.A.VijayalakshmiPai, " Neural Networks, Fuzzy Logic and Genetic Algorithms ", PHI , 2003 (Chapters 8 and 9)

Genetic Algorithm Lab

List of Experiments

1) Write a Program for Error Back Propagation Algorithm (Ebpa) Learning.
2) Study and Analysis of Genetic Algorithm Life Cycle.
3) Write a Program of Perceptron Training Algorithm.
4) Write a Program to Implement Hebb's Rule.
5) Write a Program to Implement of Delta Rule.
6) Write a Program to Implement Logic Gates.
7) Write a Program for Implementing Linear Saturating Function.
8) Predict BigMart Sales using TPOT optimized pipeline.
9) Write a program for logic gates using Rank selection
10) Implement Hybridize genetic algorithm with local search

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Data Visualization **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	-	70	-	100

Objectives:

1. Explain data visualization concepts
2. Discuss Static Graphical Techniques
3. Explain Multivariate Graphical Techniques
4. Graphical Validation and multivariate statistical visual representations

Sr. No.	Course Contents	Number of Hours
1	**Introduction to Data Visualization:** Brief history of data visualization, scientific design choices in data visualization- choice of graphical form, grammar of graphical techniques of large amount of data, crucial need of visualization techniques, challenges in visualization techniques, classification of visualization techniques for qualitative and quantitative data, power of visualization techniques, introduction to different visualization techniques.	8
2	**Static Graphical Techniques:** Introduction to bar graph, basic understanding of making basic bar graph, grouping bars together, bar graphs on counts, customization of bar graphs by changing colour, size, title, axis units, changing width and spacing of the bar chart, adding labels to bar graph, application of bar graph in business.	8
3	**Multivariate Graphical Techniques:** Introduction to correlation matrix, application of correlation matrix in the multivariate analysis, network graph, basics of heat map, difference between heat map and tree map, introduction to higher dimensional scatter plot, axis adjustment in the higher dimensional scatter plot, addition of prediction	8

	surface of higher dimensional scatter plot.	
4	**Graphical Validation:** Basics of multivariate statistical visual representations and its results, dendrogram, importance of dendrogram in grouping (cluster analysis), Scree Plot, importance of Scree Plot, application of Scree Plot in determining number of clusters and factors, QQ plot, importance of QQ plot in distribution of data for the further quantitative analysis, PP plot, applications and usage of PP Plot for distribution detection.	8
5	**Customization:** Introduction to annotations – adding : text, mathematical expression , lines, arrows, shaded shapes, highlighting the texts and items, adding error bars, introduction to axis, swapping x and y axis, changing the scaling ration in the axis, positioning of axis and arranging tick marks and labels, changing the appearance of axis labels, circular graphs, using themes, changing the appearance of theme elements, creating the own themes, legends : removing the legends, position of legends, legend title, labels in legends.	8

Course Outcomes

On completion of this course, the students will be able to

- Understand data visualization concepts
- Apply Static Graphical Techniques
- Applying Multivariate Graphical Techniques
- Illustrate the importance of dendrogram in grouping (cluster analysis)
- Implement mathematical expression, lines, arrows, shaded shapes, highlighting the texts and items to solve data visualization problems

Text Books:

1. Milan Sonka, Vaclav Hlavac, Roger Boyle, Image Processing, Analysis and Machine Vision", (2/e), 1998.
2. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, (2/e), Pearson education, 2003.
3. BoguslawCyganek& J. Paul Siebert, An Introduction to 3D Computer Vision Techniques and Algorithms, Wiley, 2009.
4. E.R. Davies, Royal Holloway, Machine Vision: Theory, Algorithms and Practicalities, (3/e), University of London, December 2004.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: NoSQL Database **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	-	70	-	100

Objectives: -

NoSQL systems are purpose-built solutions, designed to address specific technical requirements. NoSQL systems originated to provide high throughput, fault-tolerant horizontally scalable simple data storage and retrieval with a bare minimum of additional functionality.

Prerequisites: -

Database Management, Students MUST have a computer with the ability to install a virtual machine. This course will include labs that involve the installation, configuration and programming of multiple databases. It is strongly recommended that students have some experience with programming languages (e.g. Java, Python, HTML, SQL) and command-line interfaces (Windows Command Prompt, Unix shell).

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Introduction to NoSQL** Understanding NoSQL Databases, History of NoSQL, Features of NoSQL, Scalability, Cost, Flexibility, NoSQL Business Drivers, Classification and Comparison of NoSQL Databases, Consistency – Availability - Partitioning (CAP), Limitations of Relational Databases, Comparing NoSQL with RDBMS	9

2	**Design & Terminology** I Managing Different Data Types, Columnar, Key-Value Stores, Triple and Graph Stores, Document, Search Engines, Hybrid NoSQL Databases, Applying Consistency Methods, ACID, BASE, Polyglot persistence	9
3	**Evaluating NoSQL** The Technical Evaluation, Choosing NoSQL, Search Features, Scaling NoSQL, Keeping Data Safe, Visualizing NoSQL, Extending Data Layer, Business Evaluation, Deploying Skills, Deciding Open Source versus commercial software, Business critical features, Security	9
4	**Key-Value Based Databases** Introduction to Key-Value Databases, Key Value Store, Essential Features, Consistency, Transactions, Partitioning, Scaling, Replicating Data, Versioning Data, How to construct a Key, Using Keys to Locate Values, Hash Functions, Store data in Values, Use Cases.	9
5	**Document Based Databases** Introduction to Document Databases, Supporting Unstructured Documents, Document Databases Vs. Key-Value Stores, Basic Operation on Document database, Partition, Sharding, Features, Consistency, Transactions, Availability, Scaling, Use Cases	9

Learning Outcomes:-

On successful completion of the course, the student will be able to:

1. Student will be able to understand basic principles and design criteria of NoSQL databases
2. Student will be able to understand comparisons between different types of NoSQL databases
3. Student will be able to understand different features of NoSQL databases
4. Student will be able to know about data storage and processing techniques
5. Student will be able to understand the need of NoSQL database over RDBMS

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques.

Text Books:

1. NoSQL for Dummies, By: Adam Fowler, Published by: John Wiley & Sons, Inc.

2. NoSQL for Mere Mortals, By: Dan Sullivan, Published by: Pearson Education, Inc

E-Resources:-

1. NoSQL Database Fundamentals: https://www.geeksforgeeks.org/introduction-to-nosql/
2. NoSQL Database Tutorials: https://www.simplilearn.com/introduction-to-nosql-databases-tutorial-video
3. Video lectures of NoSQL Database: https://www.eduonix.com/courses/Web-Development/Learn-NoSQL-Database-Design-From-Scratch

   Complete NoSQL Database: https://www.dbta.com/Columns/Notes-on-NoSQL/

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Deep Learning **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objectives:

1. Understand basic building blocks for deep neural network architectures, through applied mathematics and machine learning basics.
2. Discuss how to design a neural network to solve a particular business problem within an optimized time.
3. Familiarize students with various types of deep networks and how to customize them.

Sr. No.	Course Contents	Number of Hours
1	**Unit I:** **RNN and LSTM:** A brief overview on modelling sequences, RNN intuition, Training RNNs with back propagation, Echo state networks, Hessian free optimization, Long short-term memory, Vanishing Gradient problem, LSTM variations, Evaluating, Improving, tuning of RNN and applications of RNN	8
2	**Unit II:** **Self-Organizing Maps:** Overview on Self-Organizing maps, SOMs intuition, work flow of SOMs, Reading an Advanced SOM, K-means clustering comparison, Evaluating and Improving of SOMs and applications of SOMs.	8

3	**Unit III:** **Auto Encoders:** Overview on Auto-Encoders, note on Biases, training an auto encoder, over complete hidden layers, sparse auto encoders, De-noising auto endoders, contractive auto-encoders, stacked auto-encoders, Deep auto encoders, Building an Auto-encoder, Tuning and optimizing and applications of auto encoders	8
4	**Unit IV:** **Boltzmann Machines:** Overview of Boltzmann Machines, Boltzmann machine Intuition, Energy-Based Models (EBM), Restricted Boltzmann Machine, Contrastive Divergence, Deep belief networks, Deep Boltzmann machines, Building, Evaluation and applications of Boltzmann Machines.	8
5	**Unit V:** **General Adversarial Networks (GANs):** Overview of GANs, Intuition behind GANs, Working of GANs, Understanding the architecture of GANs, Image creation with GANs, Evaluating, tuning the GANs and applications of GANs.	8

Course Outcomes

On completion of this course, the students will be able to

- Understand how to design deep neural network.
- Explain how to generate morph and search images with deep learning.
- Solving Problems through pre trained model.
- Learn about several deep-net architectures and how to apply them for different tasks with sequential input/output.
- Able to understand GANs and its application

Text Books:

1. Neural Networks and Learning Machine – by Simon Haykin, Third Edition, Pearson Education
2. Deep Learning – by IanGoodfellow ,YoshuaBengio and Aaron Courville ,MIT press

Deep Learning Lab

List of Experiments:

1) Predict the s
2) l/’7y y tock of the company using RNN and LSTM networks

3) Text classification using LSTM
4) Create SOM for Text Clustering based on the Retail Transactions
5) Classify the Hand-written digits using SOM netwroks
6) Build a Image Re-constructor using Auto-encoders
7) Build a recommendation engine using Boltzmann machines for entertainment sector

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Advanced Machine Learning **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	2	5	4	30	50	70	-	150

Objectives:

1) Implement Machine learning techniques using tensorflow
2) Assess ensemble models involved in machine learning concepts
3) Understand reinforcement learning concepts of machine learning
4) Test the built models using validation techniques
5) Deploy the machine learning models on cloud or local server

Sr. No.	Course Contents	Number of Hours
1	**Unit I:** **Advanced Machine learning with TensorFlow** Introduction, Tensorflow operations, declaring tensors, working with metrics, declaring operations, implementing activation functions, operations in computational graph, layering nested operations, working with multiple layers, implementing loss functions, implementing back propagation, working with batch and stochastic training, evaluating models, Implementing unit tests, multiple executors, productionalizingtensorflow.	8
2	**Unit II:** **Ensemble Methods** Bagging and Random forest, Bootstrap method, Bootstrap aggregation, Variable Importance, Boosting, AdaBoost, Boosting ensemble method, AdaBoost ensemble, CatBoost, Learning with ensembles, Implementing a simple majority vote classifier, Leveraging weak learners via adaptive boosting.	8

3	**Unit III:** **Reinforcement Learning** Introduction, formal framework, different components to learn a policy, value based methods for RL, Q-learning, fitted Q-learning, Deep Q-networks, double DQN, dueling network architecture, distributional DQN, Multi step learning, concepts of generalization, feature selection, modifying objective function, hierarchical learning, bias-over fitting tradeoff.	8
4	**Unit IV:** **Model Evaluation and Hyper-parameter Tuning** Streamlining workflows with pipelines, K-fold cross validation, Model performance measures, debugging algorithms with learning and validation curves, fine-tuning machine learning models via grid search, looking at different performance evaluation metrics, Ranking metrics, Classification metrics, regression metrics, Bootstrapping and Jackknife, Hold-out validation, difference between model validation and testing.	8
5	**Unit V:** **Machine Learning Deployment** Serializing fitted scikit – learn estimators, setting up a SQLite database for data storage, developing web application with Flask, turning the classifier into a web application, turning a regression problem into a web application, pickle model, deploying web application to a public server, Cloud deployment using AWS and Google.	8

Course Outcomes

On completion of this course, the students will be able to

- Examine with advanced machine learning concepts
- Demonstrate different ensemble methods of machine learning
- Implement reinforcement learning in real world scenarios.
- Demonstrate and deploy machine learning concepts
- Deploy machine learning algorithms on cloud

Text Books:

1) Master Machine Learning Algorithms, Jason Brownlee
2) Deeper Insights into Machine Learning, Birmingham, Packt
3) An Introduction to Deep Reinforcement Learning, Vincent François-Lavet, Peter Henderson, Riashat Islam, Marc G. Bellemare and Joelle Pineau
4) Tensorflow machine learning cookbook, Nick McClure, Packt

Lab Experiments:

1) Build a machine learning model for house price prediction analysis using lasso and ridge regression

2) Build a machine learning model on hand written digits and compare the models using evaluation techniques

3) Compare the differences between the accuracies obtained using ridge and lasso regression in first experiment

4) For the above build regression model, perform model evaluation, feature selection and parameter tuning

5) Build a classification model on heart disease UCI dataset using ensemble techniques

6) Compare the ensemble models built on heart disease data set and validate the same

7) Build a simple reinforcement learning model and use Montel Carlo learning to find the optimal combination of products using meal data with 4 ingredients and 9 products.

8) Build a Tic –Tac – Toe agent using Q-learning concept

9) Financial Time Series Monte Carlo Simulation on S&P 500 stock data.

10) Deploy a regression model of first experiment using Flask and build a web api on the same

11) Deploy the classification model of third experiment using amazon sage maker or as a pickle model as web api

12) Deploy the classification model of third experiment using Google cloud or as a pickle model as web api

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Cloud Web Services **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objectives:

- To learn how to use Cloud Services.
- To implement Virtualization
- To implement Task Scheduling algorithms.
- Apply Map-Reduce concept to applications.
- To build Private Cloud.
- Broadly educate to know the impact of engineering on legal and societal issues involved.

Sr. No.	Course Contents	Number of Hours
1	**Unit I: Introduction to Cloud Computing and Amazon Web Services** Introduction to Cloud Computing, Cloud Service Delivery Models (IAAS, PAAS, SAAS), Cloud Deployment Models (Private, Public, Hybrid And Community), Cloud Computing Security, Case Study. Introduction to Amazon Web Services, Why Amazon? Use Cases, AWS Storage Options, AWS Compute Options, AWS Database Options, AWS Workflow Automation And Orchestration Options, AWS Systems Management And Monitoring Options, AWS Virtual Private Cloud Introduction, Pricing Concepts	8
2	**Unit II: Introduction to EC2** Introduction To EC2, Instance Types And Uses, Autoscaling Instances, Amazon Machine Images (AMIS), Modifying Existing Images, Creating New Images Off Of Running Instances, Converting An Instance Store AMI To An EBS AMI, Instances Backed By Storage Types, Creating A Web Server Using Ec2, Elastics Block	8

	Storage (EBS), Elastic IPS, Route 53 DNS System, Cloudfront SNS Pricing	
3	**Unit III: S3, Cloudwatch, Elastic Beanstalk And Security** Introduction To S3, Buckets And Objects, Security, Creating A Web Server Using S3 Endpoints, Introduction To Cloudwatch, Creating Alarm Notifications, Autoscaling Instances, Deploying Scalable Application On AWS, Selecting And Launching An Application Environment, Provisioning Application Resources with Cloud formation. Describe Amazon Dynamo, Understand key aspects of Amazon RDS, Launch an Amazon RDS instance, Identify what is Cloud Formation, Describe Amazon Cloud Watch metrics and alarms, Describe Amazon Identity and Access Management (IAM), Security In AWS, IAM (Identity And Access Management), Access Control Lists (ACLs), Securing Data at Rest And In Motion, Security Groups	8
4	**Unit VI: AWS Storage, Elasticity and AWS Networking** Amazon Storage, S3 Storage Basics, Managing Voluminous Information with EBS, Glacier Storage Service, AWS Networking: Networking Basics, VLAN Basics, Basics of AWS VLANs, AWS Network IP Addressing and Mapping	8
5	**Unit V: Virtual Private Cloud (Vpc)** Load Balancers And Availability Zones, Elastic Network Interfaces (ENI), Setting Up VPC And Internet Gateway, Setting Up a Security Group, Launching And EC2 Instance And Assigning An ENI, Setting Up A VPN, Setting Up A Customer Gateway For VPN, Setting Up Dedicated Hardware For VPC, Scenario 1:VPC With A Public Subnet Only (Standalone Web), Scenario 2: VPC with Public And Private Subnets (3 Tier App), Scenario 3:VPC With Public And Private Subnets And Hardware VPN Access (Web On The Cloud, Database and App On Prem) Scenario 4: VPC With A Private Subnet Only And Hardware VPN Access. (Extension Of Your Corporate Network), Case Study	8

Outcomes:

Students can,

- Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.
- Design different workflows according to requirements and apply map reduce programming model.
- Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.
- Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds

Text Books:

1. Cloud Computing: Principles and Paradigms, RajkumarBuyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011

2. Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010

3. Amazon Web Services for Dummies, Bernald Golden, John Wiley & Sons, 2013

Cloud Web Services Lab

Practical List:

1. AWS root user account creation using AWS management console.

2. Understanding AWS Billing Dashboard and Setting up billing alerts using CloudWatch.

3. Launching an EC2 instance and accessing it through SSH using putty.

4. Creating web server on EC2, with and without bash script.

5. (i) Creating Amazon machine Image(AMI) from an existing instance (ii) Creating and customizing a new AMI.

6. Demonstrating Elastic Load Balancer with the help of 3 EC2 instances.

7. (i) Creating roles and attaching policies for EC2 service(automating START and STOP of instance) using Identity and Access Management(IAM)

(ii) Demonstrating the use of Amazon Lambda and suitable code for automating START and STOP of EC2 instance by integrating Lambda service with the respective roles created for the same.

8. Demonstrating S3-bucket creation, object upload, setting access permissions and S3 versioning.

9. Demonstrating version control in S3. Notice the difference with and without versioning after uploading object with same name but different size.

10. Creating and hosting static web site using S3 bucket.

11. Demonstrating Amazon SNS service.

12. Configuration of Database engine using Amazon RDS.

13. Creating DNS using Route 53.

14. Creating your own VPC, subnets, route tables and security groups.

15. Demonstrating the configuration of NAT gateway.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Natural Language Processing **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objectives:-

- This course aims to make students understand the pre-processing of text for natural language processing.
- To understand the importance of considering syntactic parsing.
- To understand the mechanism of natural language generation in processing of natural language.
- To understand the importance of corpus creation in natural language processing.
- To understand the different statistical techniques used in natural language processing.

Sr. No.	Course Contents	Number of Hours
1	**UNIT I:** **Introduction to Natural Language Processing:** Introduction, terminologies, challenges of text pre-processing, tokenization, sentence segmentation, lexical analysis, finite state morphonology, finite state morphology, morphology vs lexical analysis, paradigm based lexical analysis.	8
2	**UNIT II:** **Syntactic Parsing and Semantic Analysis: S**yntactic parsing, The Cocke–Kasami–Younger Algorithm, Implementing Deductive Parsing, LR Parsing, Constraint-based Grammars, Natural Language Semantics, Relational Issues in Lexical Semantics, Fine-Grained Lexical-Semantic Analysis.	8

3	**UNIT III:** **Natural Language Generation:** Introduction, The Components of a Generator, Text Planning, Pushing vs. Pulling, Planning by Progressive Refinement of the Speaker's Message, Text Schemas, The Linguistic Component, Relationship to Linguistic Theory, Chunk Size, Assembling vs. Navigating, Systemic Grammars, Functional Unification Grammars.	8
4	**UNIT IV:** **Corpus Creation :** Introduction and definition of corpus in natural language processing, corpus size, Balance, Representativeness, and Sampling, Data Capture and Copyright, Corpus Markup and Annotation, Multilingual Corpora, Multimodal Corpora, Corpus Annotation Types, Morphosyntactic Annotation, Treebanks: Syntactic, Semantic, and Discourse Annotation, The Process of Building Treebanks.	8
5	**UNIT V:** **Statistical Techniques in Natural Language Processing**: Introduction, general linear model, binary linear classification, one versus all method for multi-category classification, maximum likelihood estimation, concepts of generative and discriminative models, sequence prediction model and its application	8

Course Outcome:

Onsuccessfulcompletionofthe course,studentswillbeable to,

1. Outline the basic concepts of natural language processing and its important terminologies.
2. Analyse the key role of syntactic parsing and semantic analysis in natural language processing in unstructured data.
3. Create language generation as a part of sentimental analysis.
4. Create corpus for text analysis in natural language processing.
5. Evaluate important statistical techniques used in natural language processing.

Recommended reference books:

1. Hand Book of Natural Language Processing, Second Edition – NITIN INDURKHYA FRED J. DAMERAU, CRC Press
2. Mining Text Data - Charu C. Aggarwal, ChengXiangZhai, Springer
3. Text Mining Classification, Clustering, and Applications - Ashok N. Srivastava, Mehran Sahami, CRC Press.

Natural Language Processing Lab

Exercise – 1

a) Tokenize the sentence into words for the further analysis (using Python Function)

b) Normalize the sentence to eliminate the unwanted punctuation, converting into lower

case or upper case of the entire document, expanding abbreviation, numbers into words and canonicalization.

c) Apply similarity measures using Jaccard's Coefficient or Tanimoto coefficient

d) Apply similarity measures using the Smith Waterman distance

Exercise – 2

a) For the given data what is the maximum number of words used. Get the output for the frequently occurred word in the given data?

b) Visualize the given text data with appropriate visual techniques?

c) Get the word cloud for the given data and interpret where the management need to give highest attention to get the better income?

Exercise - 3

a) Develop a back-off mechanism for Maximum Likelihood Estimate (MLE)

b) Apply interpolation on data to get mix and match

Exercise - 4

a) Perform the sentiment analysis, classifying comments using a Bayesian analysis.

b) Using ggplot2, plot the words which occur more than 50 times.

c) Come out with word cloud and interpret the same.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: AI Platforms **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	-	70	-	100

Course Objectives:

To understand the importance of AI across different platforms

1. To understand different methods used in AI platforms for testing models
2. To understand different methods used in IBM Watson
3. To understand about Azure Cognitive Services
4. To understand Deployment in various platforms.

Sr. No	Content	Number of Hours
1	**Module 1** **Introduction to AWS** AWS Free Tier Account Setup and Overview, Introduction to AI, Machine Learning and Deep Learning, Introduction to AWS and Cloud Computing, Key Machine Learning Components and AWS Management Console Tour, AWS Regions and Availability Zones, Amazon S3, Amazon EC2 and IAM, AWS SageMaker Overview, AWS SageMaker Studio Overview, SageMaker Models Deployment, SageMaker Deepdive and AutoML, Amazon Lex, Amazon Polly	12
2	**Module 2** **Integration and Testing the ML API** API Conceptual Guide, Integration Testing Theory, Differential Testing Theory, Differential Testing Implementation, Shadow Mode Theory, Testing Models in Production, Tests in Shadow Deployments, Shadow Mode - Asynchronous Implementation, Populate Database with Shadow Predictions, Jupyter Demo - Tests in Shadow Mode, Monitoring Theory, Metrics for Machine Learning Systems, Prometheus & Grafana Overview, Infrastructure Metrics, Creating an ML System Grafana Dashboard, Monitoring Logs for ML, The Elastic Stack (Formerly	12

	ELK) – Overview, Kibana Hands-on Exercise, Setting Up a Kibana Dashboard for Model Inputs.	
3	**Module 3:** **IBM Watson** IBM Watson walkthrough, IBM Bluemix Dashboard, AI services, IBM Watson Assistant Overview, IBM Watson Discovery, IBM Watson Knowledge Studio Overview, IBM Watson Language Translator Overview and Practical, IBM Watson Natural Language Classifier Overview, IBM Watson Natural Language Understanding Overview, IBM Watson Personality Insights Overviews, IBM Watson Speech to Text, IBM Watson Tone Analyzer, IBM Watson Visual Recognition	12
4	**Module-4** **Microsoft Azure Cognitive Services** Introduction to cognitive services, Cognitive services API, Computer vision API, Categorize images, Tag and identify the content/objects within an image, Identify Faces in an image, Check the image for Adult content, Detect text within an image using OCR, Language Detection, Sentiment analysis, Key Phrase extraction, Cognitive Services With Postman.	12
5	**Module-5** **Platform Deployment** Introduction to Streamlit, Building Your First Streamlit App, Introduction to Flask, Creating Folder Contents, Flask Deployment, Heroku Deployment, Google Cloud Introduction, Google cloud platform Deployment, AWS deployment, Microsoft Asure Deployment.	12

Course Outcomes:

After completion of the course the student will be able:

Students will know to importance of AI platforms

1. Understand the various approaches used in platforms
2. Implement AI solutions for broader areas
3. Understand AI applications and Deployment
4. Differentiate possible solutions of AI applications

Text Books:

1 Beginning MLOps with MLFlow by Sridhar Alla (Author), Suman Kalyan Adari

2. AI as a Service by Peter Elger (Author), Eoin Shanaghy

Reference Books:

1. IBM Watson Projects by James Miller

2. Practical Automated Machine Learning on Azure by Deepak Mukunthu (Author), Parashar Shah

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Computer Vision **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	-	70	-	100

Objectives:

- Understand the underlying concepts behind computer vision.
- Understand classification, segmentation and detection.
- Understand the concepts of camera models along with augmented reality.
- Understand ResNet and SSD architecture.
- Understand the concept of transfer learning.

Sr. No.	Course Contents	Number of Hours
1	**Unit I:** **Convolution Neural Networks:** Overview of CNN, Intuition behind CNN, convolution operation, Depth, Stride, Padding, ReLU layer, Pooling, Flattening, Full Connection, Softmax and cross-entropy, Building a CNN, Evaluating, Improving and Tuning the CNN, plotting loss & accuracy charts, loading & saving the model, displaying model visually and applications of CNN.	8
2	**Unit II:** **Classification and Segmentation:** K-means clustering, Hierarchical clustering, spectral clustering, content based image retrieval, visual words, indexing images, searching the database for images, ranking results using geometry, building demos and web applications, KNN, Bayes classifier, SVM, optical character recognition.	8

3	**Unit III:** **ResNet and Transfer Learning:** Introduction to ResNet, ResNet architecture, Building ResNet, Conv Block Details, Identify Block details, First few layers, Completing the network, Apply ResNet, Different sized images using the same network, summary of ResNet and its applications.	8
4	**Unit IV:** **Image Captioning:** Understanding NLP for image captioning, expressing words in vector form, converting words to vectors, training and embedding, linking image and text, using RNN and CNN features to generate captions, image ranking, dense captioning, using multimodal metric space, using attention network for captioning, implementing attention based image captioning and its applications.	8
5	**Unit V:** **Single Shot Detection(SSD):** Introduction to SSD, object localization, Data Preparation, Data Annotation, object detection, problem of scale, problem of shape, SSD in tensorflow, modifying SSD to work on video, intersection over union and non-max suppression, summary of SSD and its applications.	8

Course Outcome:

On successful completion of the course, students will be able to,

1. Examine with many of the common classification methods
2. Demonstrate about importance of segmentation and detection in real world scenarios
3. Develop skills to detect and classify custom objects
4. Explain the phases and components of computer vision
5. Experiment how to build their own algorithm

Text Books:

1. Introduction to computer vision techniques and algorithms by Boguslawcyganek and J. Paul Siebert.
2. Programming computer vision with python by Jan Erik Solem
3. Mastering opencv with practical computer vision projects by Daniel Lelis Baggio.
4. Programming computer vision with python: Tools and algorithms for analysing images by Jan Erik Solem

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering (Artificial Intelligence)

Subject: Big Data Analytics **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	-	70	-	100

Objectives: -

1. To provide an overview of an exciting growing field of big data analytics.
2. To introduce the tools required to manage and analyze big data like Hadoop, NoSqlMapReduce.
3. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
4. To enable students to have skills that will help them to solve complex real-world problems in for decision support.

Prerequisites: -

1. While traditional **data analyst** might be able to get away without being a full-fledged programmer, a **big data analyst** needs to be very comfortable with coding. ...
2. **Data** Warehousing. ...
3. Computational frameworks. ...
4. Quantitative Aptitude and Statistics. ...
5. Business Knowledge.

Syllabus:-

Sr. No.	Course Contents	Number of Hours
1	**UNDERSTAND BIGDATA:** Defining Data, Types of Data, Structured Data, Semi Structured Data, Unstructured Data, How data being Generated, Different source of Data Generation, Rate at which Data is being generated, Different V's, Volume, Variety, Velocity, Veracity, Value, How single person is contributing towards	9

	BigData, Significance for BigData, Reason for BigData, Understanding RDBMS and why it is failing to store BigData. Future of BigData, BigData use cases for major IT Industries.	
2	**INTRODUCTION TO HADOOP:** What is Hadoop, Apache Community, Cluster, Node, Commodity Hardware, Rack Awareness, History of Hadoop, Need for Hadoop, How is Hadoop Important, Apache Hadoop Ecosystem, Different Hadoop offering , Hadoop 1.x Architecture, Apache Hadoop Framework, Master- Slave Architecture, Advantages of Hadoop.	9
3	**STORAGE UNIT:** Hadoop Distributed File System, Design of HDFS, HDFS Concept, How files are stored in HDFS, Hadoop File system, Replication factor, Name Node, Secondary Name Node, Job Tracker, Task tracker, Data Node, FS Image, Edit-logs, Check-pointing Concept, HDFS federation, HDFS High availability**,** Architectural description for Hadoop Cluster, When to use or not to use HDFS, Block Allocation in Hadoop Cluster, Read operation in HDFS, Write operation in HDFS, Hadoop Archives, Data Integrity in HDFS, Compression & Input Splits**.**	9
4	**PROCESSING UNIT:** What is MapReduce, History of MapReduce, How does MapReduce works, Input files, Input Format types Output Format Types, Text Input Format, Key Value Input Format, Sequence File Input Format, Input split, Record Reader, MapReduce overview, Mapper Phase, Reducer Phase, Sort and Shuffle Phase, Importance of MapReduce. Data Flow, Counters, Combiner Function, Partition Function, Joins, Map Side Join, Reduce Side Join, MapReduce Web UI, Job Scheduling, Task Scheduling, Fault Tolerance, Writing MapReduce Application, Driver Class, Mapper Class, Reducer Class, Serialization, File Based Data Structure, Writing a simple MapReduce program to Count Number of words, MapReduce Work Flows.	9
5	**YARN & HADOOP CLUSTER:** YARN, YARN Architecture, YARN Components, Resource Manager, Node Manager, Application Master, Concept of Container, Difference between Hadoop 1.x and 2.x Architecture, Execution of Job in Yarn Cluster, Comparing and Contrasting Hadoop with Relational Databases, Cluster Specification, Cluster Setup and Installation, Creating Hadoop user, Installing Hadoop, SSH Configuration, Hadoop Configuration, Hadoop daemon properties, Different modes of Hadoop, Standalone Mode, Pseudo Distributed Mode, Fully Distributed Modes.	9

Learning Outcomes:-

On successful completion of the course, the student will be able to:

1. Understand the basic concept of BigData
2. Understand different types of Data
3. Understand architecture of Hadoop and YARN
4. Understand about Processing and Storage Layer of Hadoop
5. Understand internal concept of MapReduce
6. Understand the concept of Master and Slave Architecture
7. Understand data storage and processing techniques

8. Under cluster management using YARN

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques.

Books Recommended:-

1. Hadoop: The Definitive Guide, By: Tom White, O'REILLY
2. Hadoop for Dummies, By: Dirk deRoos, Paul C. Zikopoulos, Bruce Brown, Rafael Coss, and Roman B. Melnyk, A Wiley brand
3. Hadoop in Action, Writer: Chuck Lam Published By: Manning Publications

E-Resources:-

1.**Big Data Analyst** Fundamentals: https://www.dbta.com/Columns/Big-Data-Notes/The-Fundamentals-of-Big-Data-Analytics-97569.aspx

2. **Big Data Analyst** Tutorials: https://www.tutorialspoint.com/big_data_analytics/index.htm

3. Video tutorials of **Big Data Analyst** :https://nptel.ac.in/courses/106/104/106104189/

4. Complete **Big Data Analyst** :https://examupdates.in/big-data-analytics/

SWARRNIM STARTUP & INNOVATION UNIVERSITY
Swarrnim Institute of Technology
Department of Computer Engineering
Bachelor of Technology (B. Tech) - Computer Engineering
(Cloud Technology & Information Security)
Code:_____

Subject: Android Application Development **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
3	**-**	**-**	**3**	**3**	30	0	70	0	100

Objectives: -

To provide students with an understanding of fundamental concepts in Android and hands on experience with Android programming including design, development and testing skills. On completion of this course the learner should be able to design and implement a variety of basic Android Apps.

Prerequisites: - Java programming

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Introduction to Android** • This unit covers the Android platform, installing an IDE, understanding project structure, • Building a simple application, creating activities, testing an application, and using the Android Support Library. • Introduction to the Android platform, Programming paradigms	9

	• Application Components - Part 1: Manifest File, Activities, and Intents. Introduction to the Android Development environment. Getting started building and testing • simple app – Resources, Layouts, Text & Scroll Views	
2	**User Experience** • This unit covers user interaction, user interface design principles and testing of the user interface. • User Interface Design part 1: Model-View-Presenter (MVP), User Input Controls : Button, Text Field, Seek bar, Checkbox, Radio Button, Toggle Button, Spinner, Image View, Switcher. Event Handling, Listeners. Layouts, Adapters, Navigation. User Interface Design part 2: Menus, Navigation, Action Bars, and Notifications: Status, Toasts and Dialogs, Styles and Themes, Focus, Touch Mode, Gestures.	9
3	**Background Processing** Creating background tasks: AsyncTask, AsyncTaskLoader; Network Connections. Programming paradigms • Application Components Part 2: Services – bound/unbound services, Starting and stopping services, Broadcast receivers, Content providers. Triggering, scheduling and optimizing background tasks: Notifications, Alarms, transferring data between apps.	9
4	**Data Management** • Data Access and Storage: Shared Preferences, App settings, Files & the Android File system, • SQLite Database, Loaders, Firebase. Programming paradigms Application Components Part 3: Content Providers and Content Resolvers	9
5	**Testing** Testing: Testing and Commercializing Applications - Basics of Testing, Testing from an IDE (Eclipse),	9

	• Activity testing, Service testing, Content provider testing, Test Classes, Debugging using DDMS, How to get your app on the app store.	

Learning Outcomes:-

- To provide students with an understanding of fundamental concepts in Android and hands on experience with Android programming including design, development and testing skills.
- On completion of this course the learner should be able to design and implement a variety of basic Android Apps.

Teaching & Learning Methodology:-

The challenge that teaching and learning computer programming presents, has encouraged the design and implementation of various new and innovative computer programming teaching methods. The presented methods aim to improve the students' success rates by increasing their motivation and encouraging the greater self-engagement.

Books Recommended:-

- Hello, Android Introducing Google's Mobile Development Platform, Ed Burnett The Pragmatic Bookshelf, 4th Editions, 2015
- Sams Teach Yourself Android Application Development in 24 Hours, Sams Teach Yourself Android Application Development in 24 Hours, 4th Edition, 2016

SWARRNIM STARTUP & INNOVATION UNIVERSITY
Swarrnim Institute of Technology
Department of Computer Engineering
Bachelor of Technology (B. Tech) - Computer Engineering
(Cloud Technology & Information Security)
Code: _____

Subject: Cloud Computing Solutions **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
2	**-**	**2**	**4**	**3**	**30**	**50**	**70**	**-**	**150**

Objectives: -

At the end of this course, you should be able to:

- Windows Azure is a cloud computing platform and infrastructure, for building, deploying and managing applications and service through a global network of Microsoft-managed data centers.
- Cloud Computing has emerged in recent years as a new paradigm for hosting and delivering services over the Internet.
- This course is designed to introduce the concepts of Cloud Computing as a new computing paradigm. The students will have an opportunity to explore the Cloud Computing various terminology, principles and applications.
- The course will expose students to different views of understanding the Cloud Computing such as theoretical, technical and commercial aspects.
- A variety of real case studies and existing in market cloud- based tools will be identified and studied in order to provide students with a close overview to Cloud Computing applications.

Prerequisites: - N/A

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Introduction to MS. Azure:** Introduction to MS. Azure, Virtual Machines: Creating Virtual Machines, Difference Between Basic and Standard VMs, Logging in to a VM and Working, Attaching an empty Hard Disk to VM, Hosting a Website in VM , Configuring End Points, Scaling up and Down, Creating a custom Image from VM, Creating a VM from a custom Image, Shut down VM without Getting Billed,VM Pricing.	6
2	**Managing Infrastructure in Azure:** Managing Infrastructure in Azure: Azure Virtual Networks, Highly Available Azure Virtual Machines, Virtual Machine Configuration Management, Customizing Azure Virtual Machine Networking. Load Balancing: Creating Cloud Services, Adding Virtual Machines to a Cluster, Configuring Load Balancer.	6
3	**Windows Azure:** Azure Storage: What is a Storage Account,Advantages, Tables, blobs, queues and drives, Azure Appfabric: Connectivity and Access control Automation: Introduction Windows Power Shell ,Creation of Runbooks, Uploading a Shell Script, Authoring a Shell Script.	6
4	**SQL Azure:** SQL Azure: Creating a SQL Server, Creating a SQL DB, Creating Tables, Adding Data to the Table, View Connection Strings, Security Configurations, Migrating on premise DB to SQL Azure.	6
5	**Websites:** Websites: Creating a Website, Setting deployment credentials, Choosing a platform, Setting up Default page for website, Scaling ,Auto Scaling by Time, Auto Scaling by Metric, Difference between	6

	Free, Shared, Basic and Standard websites, Creating a website using Visual studio.	

Learning Outcomes:-

They should be able to

- Students will learn the basics of cloud technology in Windows Azure services like computer service, network service, data service and App service. Programming with windows azure is also covered in depth.
- Introduce the broad perceptive of cloud architecture and model.
- Apply different cloud programming model as per need.
- Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

Books Recommended:-

Text Books:

- Virtualization with Microsoft Virtual Server 2005, Twan Grotenhuis, Rogier Dittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam, Syngress Publications, 2006
- Virtualization--the complete cornerstone guide to virtualization best practices, Ivanka Menken, Gerard Blokdijk, Lightning Source, Incorporated, 2008
- Virtualization: From the Desktop to the Enterprise, Chris Wolf, Erick M. Halter , EBook, 2005.

Practical List:-

Sr. No.	Practical
1	Create and document the process of creating a windows azure account
2	Create a virtual machine from the gallery of windows server 2008 R2
3	Create a virtual machine using the option “quick Create”
4	Create a custom VM and Capture the image
5	Create a vm from a captured image
6	Add a VMs to a cluster and deploy load balancer on the same
7	Create and publish / host a webpage in windows azure
8	Create a website using Visual studio
9	Create a SQL server DB , Create tables and add data to the table
10	Test basic sql commands on the table created in the previous step.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering

(Cloud Technology & Information Security)

Code: _____

Subject: Database Security **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
2	**-**	**2**	**4**	**3**	**30**	**50**	**70**	**-**	**150**

Objectives: -

- Demonstrate understanding of current database technology and typical database products. Demonstrate understanding of security architecture in modern computer systems in a typical enterprise.
- Formulate a working definition of database security and administration.
- Identify contemporary practices of server operating system security.
- Demonstrate the knowledge and skills for administration of user, profiles, password policies, privileges and roles.
- Manage database security on application level.
- Conduct database auditing for security and reliability.
- Implement typical security projects on enterprise systems.

Prerequisites: -

1. Advanced Database Technology, or equivalent (basic understanding on Oracle SQL and SQL script).
2. You need a high performance computer that can run Oracle database Enterprise Edition (9i, 10g or 11g).

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Unit I: Concepts of Database Security Management System** Database security concept, Importance of data, Levels of data security, Authorization in databases, Issues in database security, Concept of Least Privilege in User ID for databases. Perimeter security, firewalls, intrusion detection, and intrusion prevention	6
2	**Unit II: Concepts of NoSQL** No SQL databases introduction, Differences from classical DBMS concepts with NoSQL, Advantages of NoSQL like Elastic Scaling, Big Data, Goodbye DBAs', Economics/Cost, Flexible Data models. Non/ partial applicability of ACID (Atomicity, Consistency, Isolation, Durability), BASE Properties, CAP theorem, comparison to traditional RDBMS databases. Horizontal scalability, Benefits of NoSQL Databases compared to traditional Databases. Concept of UnSQL or Unstructured Query Language, Concept of Key Value & Tuple Store Databases, Concept of Graph Databases, Concept of Multimodel Databases	6
3	**Unit III: Encryption and Permissions in SQL Server 2012** Understanding permissions, Creating and Using database roles, using schemas for security, configuring cross-database security. Code and Data Encryption- Using service and database master keys, creating and using symmetric and asymmetric keys, creating and storing hash values, Authenticating stored procedure by signature	6
4	**Unit IV: Security of SQL Server 2012** User authorization, authentication and security, protecting data using permissions, roles, schemas, SQL firewall, web application	6

	firewall, securing dynamic SQL from injections, protecting SQL server from DoS and injection attacks.	
5	**Unit V: SQL Server Auditing** Auditing – Using the profiler to audit SQL server access, using DML trigger for auditing data modification, Using DDL triggers for auditing structure modification, configuring SQL server auditing, auditing and tracing user configurable events, policy based management, system centre advisor to analyze instances	6

Learning Outcomes:-

- Able to explain how security is ensured in database
- Learner will Justify the need for securing database in mitigating important vulnerabilities
- Learner will be able to create database application security models, database auditing models, application data auditing and practices of database auditing

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

Books Recommended:-

Text Books:

- Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008
- Database security by Silvana Castano, 2nd Edition, Pub: Addison-Wesley Professional, 2008
- Microsoft SQL server 2012 Security Cookbook by Rudi Bruchez, Pub: PACKT publishing, 1st ed; 2012

Reference Books:

- Handbook of database security: Applications and Trends Michael Gertz, Sushil Jajodia, Pub: Springer, 1st ed; 2008

- Implementing database security and auditing, Ron Ben-Natan, Pub: Digital Press, 1st ed; 2005

E-Resources:-

1, https://resources.infosecinstitute.com/database-security/#gref

2, https://docs.oracle.com/cd/B12037_01/server.101/b10743/security.htm

3, https://www.ibm.com/cloud/learn/database-security

Practical List:-

Hardware:

- I3/ I5 processor; 8GB RAM; 250GB HDD

Software:

- Windows 7/ 10; Windows server 2012 ISO, Ubuntu server ISO and Kali Linux ISO; Red Hat 7 ISO; Web browsers; VMware player; SQL server 2012 or 2014

Sr. No.	Practical
1	Configuring database security settings in SQL server
2	Understanding ports and services in SQL server
3	Foot printing a server using httprecon tool and performing vulnerability scanning on servers using OpenVas
4	Bypassing SQL database server and privilege escalation
5	Performing a security audit on SQL server using SQL Compliance manager
6	Creating SQL server authentication user and testing roles and privileges
7	Security and performance analysis of encrypted NoSQL database
8	Protecting SQL server from bruteforce attack

SWARRNIM STARTUP & INNOVATION UNIVERSITY
Swarrnim Institute of Technology
Department of Computer Engineering
Bachelor of Technology (B. Tech) - Computer Engineering
(Cloud Technology & Information Security)
Code: _____

Subject: Design & Analysis of Algorithm **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
3	**-**	**2**	**5**	**4**	**30**	**50**	**70**	**-**	**150**

Objectives: -

- To teach paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice.
- To make students understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms.
- To explain different computational models (e.g., divide-and-conquer), order notation and various complexity measures (e.g., running time, disk space) to analyse the

  Complexity/performance of different algorithms.
- To teach various advanced design and analysis techniques such as greedy algorithms,

  Dynamic programming & Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

Prerequisites: -

The readers should have basic knowledge of programming and mathematics. The readers should know data structure very well. Moreover, it is preferred if the readers have basic understanding of Formal Language and Automata Theory.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Role of Algorithms in Computing** Introduction: What is an Algorithm? Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Role of algorithms in computing, Algorithms as a technology. **Getting Started:** Fundamentals of the Analysis of Algorithm Efficiency, Asymptotic notation and Basic Efficiency Classes, Algorithm design.	9
2	**Brute Force Approaches** The method, Exhaustive search – Traveling salesman problem, Selection Sort and Bubble Sort, Sequential Search. **Sorting, Sets and Selection:** Merge sort, Quick sort, Bucket sort, Radix sort.	9
3	**Graphs** Graph abstract data type, Data structures for graphs, Graph traversals-BFS,DFS, Directed graphs, weighted graphs.	9
4	**Dynamic Programming** The method, Computing of Binomial Coefficient and Fibonacci Series, All pairs shortest path- Floyd's algorithm, Warshall algorithm.	9
5	**Greedy Algorithms- I** The greedy strategy, Greedy methods & optimization, Topological sort **Greed Algorithims-2:** Minimum cost spanning trees, Huffman codes, Single source shortest paths-Dijkstra's algorithm	9

Learning Outcomes:-

After successful completion of this course, student will be able to

- Analyse the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.

- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Teaching & Learning Methodology:-

- Lecture Explanation: Chalk Board/White Board/Smart Board
- Power Point
- Audio/Video Lectures
- Small Group Learning
- Use Of Exhibits And Displays
- Case Study
- Seminars/Expert Lecture
- Classes Outside The Class Rooms
- Role Play/ Drama
- Virtual Labs/Simulation
- Poster Presentation
- Assignment Sheet

Books Recommended:-

1. Data Structures, Algorithms and Applications in C++, SartajSahni,Second Edition. University Press 2005.
2. Introduction to the Design and Analysis of Algorithms, Anany Levitin, 2 nd Edition, Pearson Education 2007

E-Resources:-

- https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
- https://o6ucs.files.wordpress.com/2012/10/data-structures-algorithms-and-applications-in-c-by-sartraj-sahani.pdf

Practical List:-

Sr. No.	Practical
1	Write a Program to sort a set of elements by implementing Merge Sort

2	Implement Quick Sort
3	Write a Program to implement Breadth First Search method (BFS)
4	Write a Program to implement Depth First Search method (DFS)
5	Write a Program to implementing Prim's algorithm.
6	Write a Program to implement Kruskal's algorithm
7	Write a Program to implement Topological Sorting
8	Implement Dijkstra's algorithm.
9	Write a Program to sort a set of elements by implementing Radix sort
10	Write a Program to implement Floyd's &Warshall's Algorithm
11	Write a Program to compute Binomial Co-Efficient using dynamic programming
12	Write a Program to solve the Knapsack problem by dynamic programming

SWARRNIM STARTUP & INNOVATION UNIVERSITY

Swarrnim Institute of Technology

Department of Computer Engineering

Bachelor of Technology (B. Tech) - Computer Engineering

(Cloud Technology & Information Security)

Code:_____

Subject: Ethical Hacking **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
2	**-**	**2**	**4**	**3**	**30**	**50**	**70**	**-**	**150**

Objectives: -

- Acquire knowledge and skills needed for performing hacking process
- Understand the various hacking methodologies.
- Analyse the hacking process on different platforms and formal reporting writing process.

Prerequisites: -

The readers should have basic knowledge of information security.

Course outline:-

Sr. No.	**Course Contents**	**Number of Hours**
1	**Introduction to Ethical Hacking** Ethical Hacking Concepts , Scope, Types and Phases , Process of Malicious Hacking, Information Security Controls, Physical security, Incident Management, Vulnerability Assessment, Penetration Testing.	6
2	**Pre Hacking Phases**	6

	Foot printing, Reconnaissance, Scanning and Enumeration; Foot printing concepts, Foot printing methodology, Website Foot printing., Email Foot printing, Information Gathering, WHOIS Foot printing, DNS Foot printing , Foot printing through Social Engineering Foot printing tools. Foot printing Countermeasures. Overview of Scanning, Network, Scanning, methodology. Enumeration Concepts	
3	**System, Web and Network Hacking** System Hacking, Trojans and Black Box Vs White Box Techniques. Denial of Service, Botnets, Sniffers, and Hacking Web Servers: Session Hijacking, Web Application Vulnerabilities and Web Based Password Cracking Techniques, SQL Injection, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls	6
4	**Hacking Wireless Networks, Mobile Platforms** Wireless threats: Access control Attacks, Integrity Attacks, Rouge Access Point attacks, Ad Hoc Connection Attack, Jamming Signal attacks. Wireless Hacking Methodology: Foot Printing wireless Network, Wi-Fi discovery tools. Mobile Platform Attack: Vulnerabilities in Business environment, OWASP mobile top 10 risks, Security Issues – Mobile Apps, Hacking Android OS, Apple iOS, Windows phone OS, Jailbreaking, Mobile Device Management (MDM), Bring Your Own Device (BOYD), BOYD Risks, Mobile Security guidelines.	6
5	**Report writing & Mitigation** Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking	6

Learning Outcomes:-

After successful completion of this course, student will be able to

- Understand the basics of ethical hacking
- Elaborate on the hacking methodology
- Demonstrate the hacking process on different platforms
- Illustrate the various application of attacks on different wireless platforms
- Create the formal reports for the security attacks launched

Teaching & Learning Methodology:-

- Lecture Explanation: Chalk Board/White Board/Smart Board
- Power Point
- Audio/Video Lectures
- Small Group Learning
- Use Of Exhibits And Displays
- Case Study
- Seminars/Expert Lecture
- Classes Outside The Class Rooms
- Role Play/ Drama
- Virtual Labs/Simulation
- Poster Presentation
- Assignment Sheet

Textbooks:

1. CEH v9: Certified Ethical Hacker - Version 9 Study Guide by Sean-Philip Oriyano (Author), Wiley Publications , 2016

Practical List:-

Sr. No.	Practical
1	Perfroming Active and Passive resonnaissance.
2	Port Scanning information using nmap.
3	Vulnarability scanning using Wireshark.
4	Exploiting NetBIOS Vulnerability.

5	Creating and analyzing Virus.
6	Performing SQL Injection attack.
7	Creating and analyzing spoofed emails
8	Wi-fi Password Cracking.
9	Perfoming MITM attack.
10	Launching DDoS attack.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

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Code: _____

Subject: Introduction to Cryptocurrency & Bitcoin **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
3	**-**	**-**	**3**	**3**	30	0	70	0	100

Objectives: -

In this course students will be able to understand the:

- To introduce the fundamentals of crypto currencies.
- To explain importance of decentralization in bitcoin
- To introduce the concepts of bitcoin Mechanics and Storage

This course will explain the mining and bitcoin mining concepts

Prerequisites: -Cryptography fundamentals

Course outline:-

Sr. No.	**Course Contents**	**Number of Hours**
1	**Introduction to Cryptography and Cryptocurrencies** Cryptographic Hash Functions, Hash Pointers And Data Structures, Digital Signatures, Public Keys As Identities, Cryptocurrencies, Bitcoin, Ether.	9

2	**Decentralization in Bitcoin** Centralization Versus Decentralization, Distributed Consensus, Consensus Without Identity Using A Block Chain, Incentives And Proof Of Work, Cost of mining.	9
3	**Bitcoin Mechanics and Altcoins** Bitcoin Transactions, Bitcoin Scripts, Applications Of Bitcoin Scripts, Bitcoin Blocks, The Bitcoin Network, Limitations And Improvements, Altcoins: History And Motivation, A Few Altcoins In Detail, Relationship Between Bitcoin And Altcoins.	9
4	**Storage and Use Bitcoins** Simple Local Storage, Hot And Cold Storage, Splitting And Sharing Keys, Online Wallets And Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets	9
5	**Bitcoin Mining and Anonymity** The Task Of Bitcoin Miners, Mining Hardware,Cpu Mining, Gpu Mining, Fmcg Mining, Asic Mining, Energy Consumption And Ecology, Mining Pools, Mining Incentives And Strategies,Anonymity Basics, How To Deanonymize Bitcoin, Mixing, Decentralized Mixing, Zerocoin And Zerocash	9

Learning Outcomes:-

At the end of this course students will be able to

- Understands fundamentals of crypto currencies
- Implement Cost estimation techniques and planning
- Implement the concepts of mining and bitcoin mining.
- Understands concepts of bitcoin Mechanics and Storage
- Understands the different coins like Altcoins

Teaching & Learning Methodology:-

The challenge that teaching and learning computer programming presents, has encouraged the design and implementation of various new and innovative computer programming teaching methods. The presented methods aim to improve the students' success rates by increasing their motivation and encouraging the greater self-engagement.

Books Recommended:-

- Bitcoin And Cryptocurrency Technologies- By Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder.
- Daniel Drescher, "Block Chain Basics", Apress; 1st edition, 2017
- Anshul Kaushik, "Block Chain and Crypto Currencies", Khanna Publishing House, Delhi.
- Imran Bashir, "Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Packt Publishing
- Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Block Chain", Packt Publishing
- Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, "Hands-On Block Chain with Hyperledger: Building Decentralized

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Subject: Network Security **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objectives: - This course provides in-depth coverage of network security which covers firewall, attacks, and mitigations of attacks, vulnerability management and practical process to mitigate attacks and vulnerability, learner will be able to manage and engineered SSL, PKI, VPN and MD algorithms, Security controls of CompTIA, CISCO, Microsoft

Prerequisites: - To familiarize the trainee with basic in-depth knowledge of various network fundamentals, security assets, firewall, encryption, key management is necessary, understanding of hardware is also required

Major Equipment:

- PC Hard ware, Networking Hardware, DTE/DCE, OFC, WI-IF

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**UNIT I: Introduction to Network Security** Introduction of Unit, Perimeter Security, Overview of Network Security, Access Control, Device Security, Security features on	6

	Switches, Firewall, Types of firewall, Attack vector and Mitigation techniques Access Management - Securing Management Access, Multifactor Authentication, Layer 2 Access Control, Wireless LAN (WLAN) Security and Network Admission Control (NAC).	
2	**UNIT II: Threats, Vulnerabilities And Attacks** Threat, Vulnerabilities – vulnerability assessment and vulnerability scanning, Attacks – Application Attack, Network Attack and Mitigating & Deterring Attacks, Network Security – Security through network devices, Security through Network Technologies and Security through Network Design Elements, Administering a Secure Network – Network, Administrative Principles and Securing Network Application, Conclusion of the Unit	6
3	**UNIT III: Network Security Management** Introduction of Unit, Secure Socket Layer (SSL) – Introduction to SSL, Open SSL basics, Problems with SSL, Cryptography, Message Digits Algorithms, Digital Signature and Public Key Infrastructure (PKI), Data Privacy – IPsec VPN, Dynamic Multipoint VPN (DMVPN), Group Encrypted Transport VPN (GET VPN), Secure Sockets Layer VPN (SSL VPN) and Multiprotocol Label Switching VPN (MPLS VPN). Conclusion of the Unit	6
4	**UNIT IV: Network Security Controls** Introduction of Unit, Network Intrusion Prevention, Overview of Intrusion Prevention System (IPS), Intrusion Detection System (IDS), Deploying IPS and IPS High Availability, Host Intrusion Prevention, Anomaly Detection and Mitigation, Conclusion of the Unit	6
5	**Unit V: Network Management** Introduction of Unit, Security Monitoring and correlation, Security Management - Security and Policy Management and Security Framework and Regulatory Compliance, Best Practices Framework, Case Studies, Conclusion of the Unit	6

Learning Outcomes:-

On successful completion of the course, students will be able to,

1. Relate fundamental concepts of information security with network and connectivity
2. Apply their understanding of network security in identifying common issues and propose suitable solutions
3. Articulate the importance of managing the network using policies, processes and framework for effective and efficient security.

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

Books Recommended:-

TextBooks:

1. Security + Guide to Network Security Fundamentals by Mark Ciampa, Course Technology, Cengage Learning
2. Network Security with OpenSSL by Pravir Chandra, Matt Messier, John Viega, O'Reilly

ReferenceBooks:

1. CCIE Professional Development Series Network Security Technologies and Solutions by Yusuf Bhaiji, CCIE No. 9305, CISCO Press

E-Resources:-

1, https://www.hitachi-systems-security.com/blog/top-7-cyber-security-resources-you-need-to-bookmark/

2, https://www.sans.org/security-resources/

3, https://www.cyberdegrees.org/resources/the-big-list/

4, https://www.cisco.com/c/en_in/products/security/what-is-network-security.html

5, comptia.org

Practical List:-

Sr. No.	Practical
1	Firewall Configuration
2	VPN Configuration
3	IDS Configuration
4	Router Security – I
5	Router Security – II
6	Traffic Monitoring using WireShark
7	Traffic Monitoring
8	Network Security risk assessment
9	Network security policies and standards
10	VLANs & Wireless LANs
11	Defence in Depth & DMZs
12	Network Security for BYODs

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Subject: Principles of Visualization **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objectives: -

At the end of this course, you should be able to:

- Identify the need for Data Centre Virtualization
- Describe the components and features of vSphere 6.5
- Describe how VMware's products help solve business and technical challenges with regard to Data Center Virtualization

Prerequisites: - N/A

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Introduction** Introduction to Virtualization - Types of virtualization - Difference between cloud and virtualization - Physical infrastructure and virtual infrastructure - Virtualization approaches - Partitioning - Hosting - Isolation - Hardware independence - Virtual machine - Hypervisor - Types of hypervisor - Virtual machine manager - Types of hypervisor -	6

	Introduction to datacenter virtualization Esxi - Difference between Esxi and Esx - Versions of Esxi - Installation and configuration of Esxi 6.0 - vSphere 6.0	
2	**Components of vSphere 6.0** Components of VMware vSphere - vSphere 6.0: Overview and Architecture - Topology of vSphere 6.0 Data Center - vSphere 6.0 Configuration MaximumsvCenter Server - vCenter Server Features - Certificate Management - Alarms and Alerts - Monitoring Features - Template Management - Linked Mode Deployment - Storage Features in vSphere - Shared Storage - Storage Protocols - Datastores - Virtual SAN - Virtual Volumes - Networking Features in vSphere - Virtual Networking - Virtual Switches and its types	6
3	**Features of vSphere and NSX** vSphere Resource Management Features - vMotion - Distributed Resource Scheduler (DRS) - - Distributed Power Management (DPM) - Storage vMotion - Storage DRS - Storage I/O Control - Network I/O Control - vSphere Availability Features - vSphere Data Protection - High Availability - Fault Tolerance - vSphere Replication - Introduction to NSX.	6
4	**VSphere Solutions to Data Center Challenges and vSphere Security.** Challenges - Availability Challenges - Scalability Challenges - Management Challenges - Optimization Challenges - Application Upgrade Challenges - Cloud Challenges - Security - Describe the features and benefits of VMware Platform Services Controller - Configure ESXi host access and authorization - Secure ESXi - vCenter Server - and virtual machines - Upgrade ESXi and vCenter Server instances	6
5	**Resource optimization and resource management** Network Optimization - Configure and manage vSphere distributed switches - Migrate virtual machines from standard switches to distributed switches - Explain distributed switch features such as port mirroring -	6

	LACP - QoS tagging - and NetFlow - CPU Optimization - Explain the CPU scheduler operation - NUMA support - and other features that affect CPU performance - Monitor key CPU performance metrics - Memory Optimization - Explain ballooning - memory compression - and host swapping techniques for memory reclamation when memory is overcommitted - Monitor key memory performance metrics - Storage Optimization - Diagnose storage access problems - Configure VMware vSphere Flash Read Cache - Monitor key storage performance metrics\	

Learning Outcomes:-

They should be able to

- Installing and configuring the SDDC using VMware products.
- Implementing Fault tolerance and High availability for the Virtual machines
- Securing the Virtual environment.
- Resource Optimization and monitoring.

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

Books Recommended:-

Text Books:

1. Virtualization Essentials Paperback – 26 Apr 2012 by Matthew Portnoy - wiley publications
2. VMware Cookbook Paperback – 17 Jul 2012 by Troy - Shroff/O'Reilly; Second edition (17 July 2012)

Reference Book:

1. Mastering VMware vSphere 5.5 (SYBEX) Paperback – 2014 by Scott Lowe, Nick Marshall, Forbes Guthrie , Matt Liebowitz , Josh Atwell - Wiley (2014) edition.

E-Resources:-

Video Lectures

- http://labs.hol.vmware.com/HOL/catalogs/catalog/681
- http://docs.hol.vmware.com/
- http://www.ss.pku.edu.cn/vs/style/resources/Introduction%20to%20Virtualization.pdf

Practical List:-

S.NO	Name of Lab Exercise		
1	Installing and configuring ESXi 5.5/6.0 Server [On Premise]		
2	HOL-1810-01-SDC	Virtualization 101	1. Introduction to Management with vCenter Server 2. Introduction to vSphere Networking And Security
3	HOL-1810-01-SDC	Virtualization 101	3. Introduction to vSphere Storage
4	HOL-1808-01-HCI - vSAN v6.6 - Getting Started	vSAN v6.6 - Getting Started	1. vSAN 6.6 Setup and Enablement 2. vSAN Scale Out with Configuration Assist 3. vSAN All Flash Capabilities
5	HOL-1808-01-HCI - vSAN v6.6 - Getting Started	vSAN v6.6 - Getting Started	4. vSAN iSCSI Target 5. vSAN Encryption
6	HOL-1808-01-HCI - vSAN v6.6 - Getting Started	vSAN v6.6 - Getting Started	6. vSAN PowerCLI and ESXCLI 7. vSAN Stretched Cluster
	HOL-1803-01-NET - VMware NSX - Getting	VMware NSX	1. NSX Manager Installation and Configuration

7	Started		2. Logical Switching
8	HOL-1803-01-NET - VMware NSX - Getting Started	VMware NSX	3. Logical Routing 4. Edge Services Gateway
9	HOL-1811-04-SDC - vSphere Security - Getting Started	vSphere Security	1. Automating Password Complexity for ESXi Users 2. Forensic Security with vRealize Log Insight
10.	HOL-1811-04-SDC - vSphere Security - Getting Started	vSphere Security	3. VM Encryption and Encrypted vMotion 4. Secure Boot for Hosts and VMs 5. No-Cryptography Administrator Roles and Permissions

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Subject: Soft Skills and Aptitude **Semester: 5**

Listening & questioning skills and Aptitude

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
-	-	2	2	1	-	50	-	-	50

Objectives: -

To enhance the level of confidence in students and help them practice empathy, listen to others attentively and think more critically and logically before making decisions. To help students learn the techniques of enhancing and sharpening their logical reasoning skills.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Listening skills and Questioning Skills** Active listening, Barriers to listening, Asking effective questions, Being clear and succinct, Clarifying and summarising, practice sessions- role plays.	**(6 Hours)**
2	**Logical Reasoning - I** Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism, Blood Relations; concept of	**(9 Hours)**

	a statistical population and sample from a population; qualitative and quantitative data.	

Learning Outcomes:

Students will be able to overcome nervousness and stage fear at the end of the course. They will also develop better critical and logical thinking abilities; hence making them better personally and professionally. Students will be able to use their logical reasoning and thinking skills more effectively.

Reference Books:

1.Active Listening 101: How to Turn Down Your Volume to Turn Up Your Communication Skills, by Emilia Hardman, 2012

2. The Power of Communication: Skills to Build Trust, Inspire Loyalty, and Lead Effectively, by Helio Fred Garcia, 2012

3. Power Listening: Mastering the Most Critical Business Skill of All, by Bernard T. Ferrari, 2012

4. Fitly Spoken: Developing Effective Communication and Social Skills, by Greg S. Baker, 2011

5. The Secrets of Successful Communication: A Simple Guide to Effective Encounters in Business (Big Brain vs. Little Brain Communication), by Kevin T. Mc Carney, 2011.

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Subject: Cloud Web Services **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
3	**-**	**2**	**5**	**4**	30	50	70	-	150

Course Objective:

- To help students relate concepts of information security with Cloud computing
- To make it possible for students to learn how important principles of Security are implemented in virtualization and Cloud platforms in managing issues and challenges in Private Cloud deployment using Amazon and OpenStack platforms

Prerequisites:

- Knowledge of Operating Systems. As Amazon Cloud is a broad area, it is important to know the simple concepts relevant to operating systems, like Windows, Linux, etc.
- Understanding of Virtualization.
- Knowledge of Networking**.**
- Basic concepts of information security and Cloud computing

Course outline:-

Sr. No.	**Course Contents**	**Number of Hours**

1	**CLOUD COMPUTING AS A SERVICE** Cloud Computing, Software-as-a-service: SaaS, Platform-as-a-service: PaaS, Hardware-as-a-service: HaaS, Infrastructure-as-a-service: IaaS, Google Cloud Infrastructure, Google File System, Search engine, Map Reduce, Grid Computing, Amazon Web Services, REST APIs, SOAP API, Query API, User Authentication, Connecting to the Cloud, Open SSH Keys, Tunneling / Port Forwarding, Simple Storage Service – S3, Overview, Buckets, Objects, ACL, Logging, Signed URI, S3 Applications, Elastic Cloud Compute - EC2.	9
2	**UNIT II NETWORKING BASICS** Overview, Keypairs, Network Types, LAN, Gateways and Router, IP Classes and Subnets, CIDR, Utilities, Instances Management, Image Management, Security groups, Amazon Elastic Block Storage - EBS, Ubuntu in the Cloud, Installation, Utilities, File system, Shell.	9
3	**UNIT III: PROGRAMMING AND CONTROL STRUCTURES** Programming, Control Structures, Event based Init Daemon, Apache Instances in EC2, Introduction, Installation and Running, Testing server and content, Configuring Apache, Directives, Virtual hosts, Amazon Simple Queue Service, Amazon Simple Notification Service, Amazon Simple DB, Amazon Relational Database Service, Mysql Server Replication in Cloud, Mysql Database, Batch mode, Mysql Apache Integration, Storage Engines, Replication Basics, Availability and scalability, Caching, Proxy.	9
4	**UNIT IV BACKUP AND RECOVERY** Backup and Recovery, Database Sharding, EC2 Applications, Web application design, Focus on Search Engine, Security, Firewall, Data, Network and Host, AWS EC2 Capacity Planning, Apache Servers, Mysql Servers.	9
5	**UNIT V AMAZON CLOUD AND OPEN STACK** Amazon Cloud Watch, Monitoring Tools, Amazon Cloud Front,	9

	Youtube, Amazon Elastic Load Balancing, Cluster Balancing, Amazon Auto Scaling, Apache Scaling, Mysql Scaling, Amazon Virtual Private Cloud, DHCP, DNS, NFS, NIS, Virtualization, Private Cloud for Enterprise, Hybrid Cloud for Enterprise, OpenStack Cloud platform, architecture, Private Cloud deployment, SELinux policies, Security features	

Learning Outcomes:-

On successful completion of the course, students will be able to,

- Analyze the private cloud setup with its vulnerabilities and applications using different architectures.
- Design different workflows according to requirements and apply map reduce programming model.
- Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms
- Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds
- Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application
- Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

Books Recommended:-

Text Books:

TEXT BOOKS:

1. Cloud Computing: Principles and Paradigms, Editors: RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011

2. Visible Ops Private Cloud: From Virtualization to Private Cloud in 4 Practical Steps, Andi Mann, Kurt Milne, Jeanne Morain, IT Process Institute, Inc.; first edition (April 8, 2011)

3. OpenStack Cloud Security by Fabio Alessandro Locati, Packt Publishing Limited (28 July 2015)

REFERENCE BOOK:

1. Cloud Computing Explained: Implementation Handbook for Enterprises, John Roton, Recursive Press (November 2, 2009)

E-Resources:-

1 http://fit.mta.edu.vn/files/DanhSach/_R_Book_HP_cloudcomputingfordummies.pdf

List of Experiments:

1. AWS root and user account creation using AWS management console.
2. Setting up monthly billing alerts using SNS
3. Launching EC2 instance and accessing it through SSH using putty
4. Demonstrating cross region replication through EBS snapshot.
5. Demonstrating bucket creation and version control with the help of S3.
6. Creating and hosting static web site using S3 bucket.
7. Demonstrating Elastic Load Balancer with the help of 4 EC2 instances.
8. Configuration of Database engine using Amazon RDS
9. Multi region deployment of RDS database engine
10. Demonstrating Amazon SNS service.
11. Creating your own VPC, subnets, route tables and security groups.
12. Demonstrating the configuration of NAT gateway.

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Subject: Defense in Depth **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objectives:-To help students relate concepts of threat and risk management, vulnerability assessment and penetration testing, vulnerability management. To make it possible for students to learn how important principles of identity access and management.To facilitate students to understand how security architecture and controls.

Prerequisites:-Basic concepts of information security and computer networks.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Threat Management** Identify Security Control Types, Explain the Importance of Threat Data and Intelligence, Classify Threats and Threat Actor Types, Utilize Attack Frameworks and Indicator Management, Utilize Threat Modeling and Hunting Methodologies. Analyzing Security Monitoring Data (Network, Appliance, Endpoint, Email). Collecting and Querying Security Monitoring Data, Configure Log Review and SIEM Tools,	6

	Analayze and Query Logs and SIEM Data.	
2	**Risk and Vulnerability Management** Identify Digital Forensics Techniques, Anlayze Network-related IoCs, Analyze Host-related IoCS, Analyze Application-Related IoCs, Applying Incident Response Procedures. Applying Risk Mitigation and Security Frameworks. Analyze Output from Enumeration Tools, Configure Infrastructure Vulnerability Scanning Parameters, Analyze output from infrastructure vulnerability scanning, Mitigate vulnerability Issues.	6
3	**Penetration Testing** Planning and Scoping Penetration Tests, Conducting Passive Reconnaissance, Performing Non-Technical Tests, Conducting Active Reconnaissance (Scan Networks, Enumerate Targets, Scan for Vulnerabilities), Analyzing Vulnerabilities, Penetrating Networks, Exploiting Host-based Vulnerabilities (Windows and Linux), Testing applications, Post-Exploit Tasks, Analyzing and Reporting Pentest Results.	6
4	**Security Architecture and Design** Implementing a Secure Network Architecture Concepts, Configure Network Access Controls, Secure Switching Infrastructure, Secure Routing and NAT Infrastructure, Configure Firewalls and Proxies, Configure Load Balancers, Configure Intrusion Detection/Prevention Systems, Data Loss Prevention (DLP) Systems, Logging and SIEM Systems.	6
5	**Identity and Access Management** Compare and Identity and Authentication Concepts, Configure Authentication Protocols, Implement Multifactor Authentication, Configure Authorization and Directory Services, Access Management Controls, Differentiate Account management Practices, Account Auditing and Recertification.	6

Learning Outcomes:-

After learning the course the students should be able to:

- Detect various types of compromise and have an understanding of penetration testing and vulnerability scanning concepts.
- Configure identity and access services, as well as management controls
- Implement and summarize risk management best practices and business impact

E-Resources

1. Cyber Security Analyst+ by ComPTIA
2. PenTest+ by ComPTIA
3. Security+ by ComPTIA

Practical List:-

Practical
1. Design and implementation of Security Architecture for lab environment
2. Configuration secure network architecture and securing network components
3. Building Security Operations Centre (SOC)
4. Understanding multi-layer defense-in-depth Security Architecture
5. Design and Implement Secure Network Architecture Concepts
6. Implement Secure System design
7. Implement Security Implications of embedded systems (SCADA/ICS, SoC, HVAC)
8. Install and configure identity and access services a. LDAP b. Kerberos c. PAP d. SAML e. OpenID Connect f. OAUTH g. NTLM h. Secure token i. NTLM
9. Implement identity and access management controls a. Access controls models (MAC, DAC, ABAC)

b. Biometric factors
c. Tokens
d. Certificate-based authentication
e. File system security
f. Database security

10. Given a scenario, differentiate common account management practices.
    a. Account types
    b. General Concepts
    c. Account policy enforcement
11. Given a scenario, conduct information gathering using appropriate techniques
    a. Scanning
    b. Enumeration
    c. Packet crafting
    d. Packet inspection
    e. Fingerprinting
    f. Cryptography
    g. Eavesdropping
12. Given a scenario, perform a vulnerability scan.
    a. Credentialed vs. non-credentialed
    b. Types of scan
    c. Application scan
13. Analyze vulnerability scan results. (False positives)
14. Given a scenario, exploit network based vulnerabilities
    a. NETBIOS,
    b. SMB exploits
    c. SNMP exploits
    d. FTP exploits
    e. Man-in-the-middle attacks
15. Given a scenario, exploit application-based vulnerabilities
    a. Injections
    b. Authentication

c. Authorization
d. XSS
e. CSRF
f. Security Misconfiguration

16. Given a scenario, exploit local host vulnerabilities
    a. OS vulnerabilities
    b. Unsecure service and protocol configurations
    c. Privilege escalation
    d. Default account settings

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Subject: Digital Forensic Investigation **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
2	**-**	**2**	**4**	**3**	30	50	70	-	150

Course Objective:

- To understand how computer forensics is used as a powerful technique in digital investigation.
- To choose the process, various steps, tools and techniques involved in computer forensics.
- To appraise the need for understanding legal aspects of computer forensic investigation and need for meticulous documentation.
- To learn the various methods to investigate cybercrime and associated cyber laws
- To explore analysis of web server in a forensically sound manner.

Prerequisites:

- Knowledge of Operating Systems and information security
- Understanding of Ethical hacking
- Knowledge of Networking**.**

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Computer Forensics** Introduction to Computer Forensics, Forms of Cyber Crime, First Responder Procedure- Non-technical staff, Technical Staff, Forensics Expert and Computer Investigation procedure.	9
2	**Storage Devices & Data Recovery Methods** Storage Devices- Magnetic Medium, Non-magnetic medium and Optical Medium. Working of Storage devices-Platter, head assembly, spindle motor. Data Acquisition, Data deletion and data recovery method and techniques.	9
3	**Forensics Techniques** Windows forensic, Linux Forensics, Mobile Forensics, Steganography, Application Password cracking-Brute force, Dictionary attack, Rainbow attack. Email Tacking – header option of SMTP, POP3, IMAP.	9
4	**Cyber Law** Corporate espionage, Evidence handling procedure, Chain of custody, Main features of Indian IT Act 2008 (Amendment).	9
5	**Forensic Analysis of Web Server** Developing , administering and managing a remotely hosted web site, Use of HTML browsers on ports other than 80, Control Panel – Forensics traces left on web site admin machine, traces left on hosting servers. Anti-Forensics Techniques – Methods used to thwart subsequent forensics analysis, Forensics traces left, Approaches that may be used to reduce the effectiveness of these methods. Internet and Web attack forensics.	9

Learning Outcomes:-

On successful completion of the course, students will be able to,

- Explain the importance of computer forensic in achieving the goals of information security
- Identify steps involved in recovering data stored in various devices and various techniques used in windows, linux, network and web application forensics
- Justify the need for meticulous documentation in computer forensics
- Apply the rationale for having an adequate legal framework when dealing with computer forensics
- Explore the kind of crime associated with different web servers and create documentation.

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

Books Recommended:-

Text Books:

1. Computer Forensics: Computer Crime Scene Investigation by John Vacca, Laxmi Publications, 1st; 2015.
2. Digital Forensic: The Fascinating World of Digital Evidences by Nilakshi Jain, et.al, Wiley, 1st ed; 2016.
3. Windows Registry analysis by Harlan Carvey, 2010
4. The Art of Memory Forensics by Michael Hale Ligh, Andrew Case, Jamie Levy, Aron Walters

References:

1. Hacking Exposed Computer Forensics – Aaron Philipp, David Cowen, Chris Davis, Pub:

McGraw hill-2011

2. Malware Forensics Field Guide for Windows System , CameroH.Malin, Eoghan Casey, James M.Acuilina, Curtis W.Rose, Syngress, 2012 Books
3. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics by John Sammons, Syngress, 2nd ed; 2014.
4. Cyber Forensics in India: A Legal Perspective by Nishesh Sharma, Universal Law Publishing – an imprint of LexisNexis; First 2017 edition.

List of Experiments:

1. Evidence gathering using Dos and Sysinternals commands.
2. To gather information about the suspect's system using a Live CD HELIX without altering the state of the suspects system.
3. Creating & Investigating the Bit Stream Image with Cyber check suite & Helix.
4. To recover delete files and lost partitions using any predefined tool.
5. Analysing Windows registry.
6. Application password cracking.
7. To hide the document in image file using Steganography methods.
8. Analysing Steganographed Image using Hex –Editor
9. Event logger analysis in Windows
10. Analysing the email headers
11. Exploration and analysis of web servers.
12. Imaging and analyzing of mobile phone devices.

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Code: _____

Subject: Infrastructure Automation **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	-	70	-	100

Objectives:-

- Students learn the concepts of chef and its cookbooks as well as related servers and its implementation.
- Students will explore the concepts of puppet infrastructure and its associated resource and manifests.

Prerequisites:-Basic concepts of information security and computer networks.

Course outline:-

Sr. No.	Course Contents	Number of Hours
I	**INTRODUCTION TO CHEF:** Idempotency/convergence - test & repair model - Common resources and their actions- Default actions- The ':nothing' action - The 'supports' directive - The 'not_if' and 'only_if' directives - Resource extensibility -RECIPES: What a recipe is - Importance of the	9

	resource order - How to use 'include_recipe' - What happens if a recipe is included multiple times in a run_list - The 'notifies' and 'subscribes' directives.	
II	**COOKBOOKS AND CHEF SERVER:** Cookbook contents - Naming conventions - Cookbook dependencies - The default recipe - How the Chef server acts as an artifact repository - How the Chef server acts as an index of node data - Chef solo vs Chef server - Chef server's distributed architecture - Scalability.	**9**
III	**CHEF CLIENT:** The function of Chef client vs the function of Chef server - What 'why-run' is - How to use '--local-mode' - How the Chef client and the Chef server communicate - The Chef client configuration - What a node is - What a node object is - How a node object is stored on Chef server - How to manage nodes - How to query nodes - How to name nodes.	**9**
IV	**PUPPET INFRASTRUCTURE:** Introduction To Configuration Management - Importance of puppet - How To Access Your Working Files - Puppet Agents - Puppet Masters Systems Orchestration - Cross Platform Puppet.	**9**
V	**RESOURCE AND MANIFESTS:** Introduction To Puppet Run Cycle - Gathering System Facts - Node Matching And Catalogue Compilation - Puppet Resources - How To Define System Resources - Applying A Simple Puppet Manifest - Puppet Types - The Package File Service Pattern - Applying Conditional - - Logic In Puppet - Fact Conditionals - Choosing A Course Of Action.	**9**

Learning Outcomes:-

After learning the course the students should be able to:

- To understand the concept of DevOps.
- Realize the infrastructure automation in cloud.
- Managing the services with code.
- Implementing Code as a service using puppet and chef.
- Explore how to create puppet infrastructure.

Books Recommended:-

- Managing Infrastructure with Puppet Paperback – 29 Jun 2011 by James Loope.
- Chef Cookbook Paperback – Import, 3 Feb 2017 by Matthias Marschall (Author).
- DevOps for Beginners: Hands-on Guide Kindle Edition by David Johnson – 2016 edition.

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Subject: Introduction to Data Science **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	0	70	0	100

Objectives:-

- Apply quantitative modelling and data analysis techniques to the solution of real world business problems, communicate findings, and effectively present results using data visualization techniques.
- Recognize and analyse ethical issues in business related to intellectual property, data security, integrity, and privacy.

Prerequisites:-NA

Course outline:-

Sr. No.	Course Contents	Number of Hours
I	**INTRODUCTION TO CHEF:** Idempotency/convergence - test & repair model - Common resources and their actions- Default actions- The ':nothing' action - The 'supports' directive - The 'not_if' and 'only_if' directives - Resource extensibility	9

	-RECIPES: What a recipe is - Importance of the resource order - How to use 'include_recipe' - What happens if a recipe is included multiple times in a run_list - The 'notifies' and 'subscribes' directives.	
II	**COOKBOOKS AND CHEF SERVER:** Cookbook contents - Naming conventions - Cookbook dependencies - The default recipe - How the Chef server acts as an artifact repository - How the Chef server acts as an index of node data - Chef solo vs Chef server - Chef server's distributed architecture - Scalability.	**9**
III	**CHEF CLIENT:** The function of Chef client vs the function of Chef server - What 'why-run' is - How to use '--local-mode' - How the Chef client and the Chef server communicate - The Chef client configuration - What a node is - What a node object is - How a node object is stored on Chef server - How to manage nodes - How to query nodes - How to name nodes.	**9**
IV	**PUPPET INFRASTRUCTURE:** Introduction To Configuration Management - Importance of puppet - How To Access Your Working Files - Puppet Agents - Puppet Masters Systems Orchestration - Cross Platform Puppet.	**9**
V	**RESOURCE AND MANIFESTS:** Introduction To Puppet Run Cycle - Gathering System Facts - Node Matching And Catalogue Compilation - Puppet Resources - How To Define System Resources - Applying A Simple Puppet Manifest - Puppet Types - The Package File Service Pattern - Applying Conditional - - Logic In Puppet - Fact Conditionals - Choosing A Course Of Action.	**9**

Learning Outcomes:-

After learning the course the students should be able to:

- To understand the concept of DevOps.
- Realize the infrastructure automation in cloud.
- Managing the services with code.
- Implementing Code as a service using puppet and chef.
- Explore how to create puppet infrastructure.

Books Recommended:-

- Managing Infrastructure with Puppet Paperback – 29 Jun 2011 by James Loope.
- Chef Cookbook Paperback – Import, 3 Feb 2017 by Matthias Marschall (Author).
- DevOps for Beginners: Hands-on Guide Kindle Edition by David Johnson – 2016 edition.

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Subject : Introduction to Internet of Things **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	0	70	0	100

Objectives:-

- Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design and develop IoT Devices.

Prerequisites:-NA

Course outline:-

Sr. No.	Course Contents	Number of Hours
I	**Introduction to IoT** M2M to IoT, The Vision, Introduction, From M2M to IoT, M2M towards IoT, the global context, A use case example, Differing Characteristics. M2M to IoT – A Market Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The International driven global value chain and global information monopolies.	9

II	**IoT Technology Fundamentals and Architecture** M2M and IoT Technology Fundamentals**,** Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, M2M and IoT Analytics, Knowledge Management. IoTArchitecture,State of the Art – Introduction, State of the art, **Architecture Reference Model,** Introduction, Reference Model, and architecture.	**9**
III	**Cloud Computing Basics** Cloud computing components, Infrastructure, services, storage applications, database services – Deployment models of Cloud, Services offered by Cloud, Benefits, and Limitations of Cloud Computing – Issues in Cloud security, Cloud security services and design principle.	**9**
IV	**Privacy, Security, and Governance** Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT,Data, Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security	**9**
V	**IoT Applications** Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.	**9**

Learning Outcomes:-

After learning the course the students should be able to:

- Understand the application areas of IOT
- Discover the revolution of Internet in Mobile Devices, Cloud and Sensor Networks

- Understand building blocks of Internet of Things and characteristics.
- Elaborate various privacy and security issues.
- Develop IoT applications for industry and for real life applications.

Books Recommended:-

1. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to. Connecting Everything”, 1st Edition, Apress Publications, 2013
2. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, “Cloud Computing: A Practical Approach”, Tata McGraw Hill Edition, Fourth Reprint, 2010.
3. Kris Jamsa, “Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and more”, Jones and Bartlett Learning Company LLC, 2013.
4. “Internet of Things Applications, From Research and Innovation to Market Deployment ” By OvidiuVermesanand Peter Friess, ISBN:987,87,93102,94,1, River Publishers

E-Resources:

1. https://www.meshdynamics.com/documents/Rethinking,Internet,Of,Things,Book.pdf

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Subject: Linux Security Forensics **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objective:

1. To introduce the basics of linux security and associated terminologies.
2. To understand the types on communications on data networks.
3. To gain knowledge of wireless frequency bands and related wireless attacks.
4. To explore the knowledge of interpreting various web based attacks.
5. To simulate the concepts on netfilter and perform live acquisition process.

Course outline:-

Sr. No.	Course Contents	Number of Hours
I	**Introduction To Linux Security** Comprehensive Constraints, Elements of Security, Interactive Controls, Process Controls, Local Access Control-Console Access, Privilege Escalation, File Permissions and Attributes, Volatile Data..	6
II	**Data Networks Security**	6

	Network Visibility, Systems Profiling, Network Architecture, Covert Communications and Clandestine Administration; Voice over IP-VoIP Attack Taxonomy Network Attacks, System Attacks, Signalling Attacks, Transport Attacks.	
III	**Wireless Attacks** Wireless Networks-The State of the Wireless, Wireless Hacking Physics, RF Spectrum Analysis, Exploiting 802.11, The Hacker Way, Wireless Auditing Activities and Procedures, Bluetooth Profiles, Entities on the Bluetooth Protocol Stack..	**6**
IV	**Web Application Hacking** Enumeration, Access and Controls Exploitation, Insufficient Data Validation, Web 2.0 Attacks, Trust Manipulation, Man-in-the-Middle, Web Infrastructure Attacks, Mail Services-SMTP Basics, SMTP Attack Taxonomy, Alteration of Data or Integrity, Denial of Service or Availability.	**6**
V	**Net Filter** Net Filter Enhancements, Enhanced Wireless Stack, File System Enhancement, Additional Kernel Resources, The Forensic Workstation, Live Investigation/Acquisition, Post Mortem Analysis, Handling Electronic Evidence.	**6**

Text Books:

1. UNIX and Linux Forensic Analysis DVD Toolkit Chris Pogue, Cory Altheide, Todd Haverkos

Course Outcomes:

On successful completion of the module students will be able to:

- Understand the basics of Linux Security
- Illustrate the various data network security attacks
- Explore different wireless attacks
- Demonstrate the various web application attacks
- Elaborate the process of live acquisition and evidence handling process

List of Experiments

1. Exploit operating system Client, side vulnerability
2. Crafting a packet to perform ICMP packet spoofing
3. Write a script to check if an ftp server allows anonymous logins
4. Demonstration of transport attacks.
5. Case studies on CIA.
6. Configuring the DoS attack.
7. Perform a bit stream image of linux OS.
8. Perform a post mortem analysis on linux OS after launching any MITM attack.

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Subject: Storage & Datacenter **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**P**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
3	**-**	**-**	**3**	**3**	30	-	70	-	100

Objectives:-

- To impart the basic concepts of Storage systems and Datacenter environment.
- To understand concepts about RAID techniques.
- To understand basic concepts about NAS and SAN.
- To understanding about taking backup and restoring the data with the help of Business Continuity and Disaster Recovery concepts and tools.
- To understand about Data Center Consolidation and Clustering.

Prerequisites:-Basic concepts of information security and computer networks.

Course outline:-

Sr. No.	**Course Contents**	**Number of Hours**
I	**Introduction to Storage System** **Introduction to Information Storage:** Information Storage, Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing	9

	Data Center Environment: Application, Database Management System (DBMS), Host (Compute), Connectivity, Storage, Host Access to Data, Direct-Attached Storage, Storage Design Based on Application **Data Protection (RAID):** RAID Implementation Methods, RAID Array Components, RAID Techniques, RAID Levels, RAID Impact on Disk Performance, RAID Comparison.	
II	**Storage Networking Technologies** **Network-Attached Storage:** General-Purpose Servers versus NAS Devices, Benefits of NAS, File Systems and Network File Sharing, Components of NAS, NAS I/O Operation, NAS Implementations, NAS File-Sharing Protocols, Factors Affecting NAS Performance , File-Level Virtualization. **Fibre Channel Storage Area Networks:**Fibre Channel Overview, The SAN and Its Evolution, Components of FC SAN, FC Connectivity, Switched Fabric Ports, Fibre Channel Architecture, Fabric Services, Switched Fabric Login Types, Zoning, FC SAN Topologies, Virtualization in SAN. **IP SAN and FCoE**: iSCSI, FCIP, FCoE	9
III	**Backup and Disaster Recovery** **Introduction to Business Continuity:** Information Availability, BC Terminology, BC Planning Life Cycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions. **Backup and Archive:** Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Architecture, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Targets, Data Deduplication for Backup, Backup in Virtualized Environments, Data Archive, Archiving Solution Architecture.	9
IV	**Data Center Consolidation** **Reasons for Data Center Consolidation:** Reasons for Data	9

	Center Consolidation, Consolidation Opportunities. **Data Center Consolidation Phases:** Phase 1: Study and Document the Current Environment, Phase 2: Architect the Target Consolidated Environment, Phase 3: Implement the New Architecture, Phase 4: Control and Administer the Consolidated. **Best Practices in IT:** Defining Best Practices, Deploying Best Practices, Benefits of Best Practices, Systems Management Best Practices, Server Cluster Best Practices, Data Storage Best Practices, Network Management Best Practices, Documentation Best Practices, Network Diagram Documentation, Documentation Formats.	
V	**Data Center Clusters** **Cluster Architecture:** Asymmetric Two-Node Clusters, Symmetric Two-Node Clusters, Complex Cluster Configurations, Failover Policies, Best Practices. **Cluster Requirements:** Required Hardware Cluster Components, Cluster Software Requirements, What Happens During Service Failover, Cluster Installation Checklist. **Designing Cluster-Friendly Applications**: Automating Operations, Controlling Application Failover Time, Reducing Data Loss During Failover, Minimizing Application Failures, Designing Node-Independent Applications, Minimizing Planned Downtime, Restoring Client Connections.	9

Learning Outcomes:-

After learning the course the students should be able to:

- Understand the various Storage devices and technologies
- Summarize the advantages and functionality of NAS and SAN.
- Appreciate knowledge on Backups and Disaster Recovery.
- Describe Data Center Consolidation and its phases.
- Appreciate knowledge on design and analysis of Cluster Architecture.

Books Recommended:-

- Information Storage and Management (Storing Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments) 2nd Edition by SomasundaramGnanasundaramAlok Shrivastava.
- Administering Data Centers: Servers, Storage, and Voice over IP By Kailash Jayaswal ISBN-13: 978-0471771838.
- Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, ISCSI, INFINIB and FOCE by Ulf Troppens.
- Storage Management in Data Centers: Understanding, Exploiting, Tuning, and Troubleshooting Veritas Storage Foundation by Volker Herminghaus and Albrecht Scriba.
- Blade Servers and Virtualization: Transforming Enterprise Computing While Cutting Costs by Barb Goldworm and Anne Skamarock.

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Subject: Cloud Computing Solutions **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
2	**-**	**2**	**4**	**3**	**30**	**50**	**70**	**-**	**150**

Objectives: -

At the end of this course, you should be able to:

- Windows Azure is a cloud computing platform and infrastructure, for building, deploying and managing applications and service through a global network of Microsoft-managed data centers.
- Cloud Computing has emerged in recent years as a new paradigm for hosting and delivering services over the Internet.
- This course is designed to introduce the concepts of Cloud Computing as a new computing paradigm. The students will have an opportunity to explore the Cloud Computing various terminology, principles and applications.
- The course will expose students to different views of understanding the Cloud Computing such as theoretical, technical and commercial aspects.
- A variety of real case studies and existing in market cloud- based tools will be identified and studied in order to provide students with a close overview to Cloud Computing applications.

Prerequisites: - N/A

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Introduction to MS. Azure:** Introduction to MS. Azure, Virtual Machines: Creating Virtual Machines, Difference Between Basic and Standard VMs, Logging in to a VM and Working, Attaching an empty Hard Disk to VM, Hosting a Website in VM , Configuring End Points, Scaling up and Down, Creating a custom Image from VM, Creating a VM from a custom Image, Shut down VM without Getting Billed,VM Pricing.	6
2	**Managing Infrastructure in Azure:** Managing Infrastructure in Azure: Azure Virtual Networks, Highly Available Azure Virtual Machines, Virtual Machine Configuration Management, Customizing Azure Virtual Machine Networking. Load Balancing: Creating Cloud Services, Adding Virtual Machines to a Cluster, Configuring Load Balancer.	6
3	**Windows Azure:** Azure Storage: What is a Storage Account,Advantages, Tables, blobs, queues and drives, Azure Appfabric: Connectivity and Access control Automation: Introduction Windows Power Shell ,Creation of Runbooks, Uploading a Shell Script, Authoring a Shell Script.	6
4	**SQL Azure:** SQL Azure: Creating a SQL Server, Creating a SQL DB, Creating Tables, Adding Data to the Table, View Connection Strings, Security Configurations, Migrating on premise DB to SQL Azure.	6
5	**Websites:** Websites: Creating a Website, Setting deployment credentials, Choosing a platform, Setting up Default page for website, Scaling ,Auto Scaling by Time, Auto Scaling by Metric, Difference between	6

	Free, Shared, Basic and Standard websites, Creating a website using Visual studio.	

Learning Outcomes:-

They should be able to

- Students will learn the basics of cloud technology in Windows Azure services like computer service, network service, data service and App service. Programming with windows azure is also covered in depth.
- Introduce the broad perceptive of cloud architecture and model.
- Apply different cloud programming model as per need.
- Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

Books Recommended:-

Text Books:

- Virtualization with Microsoft Virtual Server 2005, Twan Grotenhuis, Rogier Dittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam, Syngress Publications, 2006
- Virtualization--the complete cornerstone guide to virtualization best practices, Ivanka Menken, Gerard Blokdijk, Lightning Source, Incorporated, 2008
- Virtualization: From the Desktop to the Enterprise, Chris Wolf, Erick M. Halter , EBook, 2005.

Practical List:-

Sr. No.	Practical
1	Create and document the process of creating a windows azure account
2	Create a virtual machine from the gallery of windows server 2008 R2
3	Create a virtual machine using the option “quick Create”
4	Create a custom VM and Capture the image
5	Create a vm from a captured image
6	Add a VMs to a cluster and deploy load balancer on the same
7	Create and publish / host a webpage in windows azure
8	Create a website using Visual studio
9	Create a SQL server DB , Create tables and add data to the table
10	Test basic sql commands on the table created in the previous step.

SWARRNIM STARTUP & INNOVATION UNIVERSITY

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Subject: Database Security **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
2	**-**	**2**	**4**	**3**	**30**	**50**	**70**	**-**	**150**

Objectives: -

- Demonstrate understanding of current database technology and typical database products. Demonstrate understanding of security architecture in modern computer systems in a typical enterprise.
- Formulate a working definition of database security and administration.
- Identify contemporary practices of server operating system security.
- Demonstrate the knowledge and skills for administration of user, profiles, password policies, privileges and roles.
- Manage database security on application level.
- Conduct database auditing for security and reliability.
- Implement typical security projects on enterprise systems.

Prerequisites: -

1. Advanced Database Technology, or equivalent (basic understanding on Oracle SQL and SQL script).
2. You need a high performance computer that can run Oracle database Enterprise Edition (9i, 10g or 11g).

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Unit I: Concepts of Database Security Management System** Database security concept, Importance of data, Levels of data security, Authorization in databases, Issues in database security, Concept of Least Privilege in User ID for databases. Perimeter security, firewalls, intrusion detection, and intrusion prevention	6
2	**Unit II: Concepts of NoSQL** No SQL databases introduction, Differences from classical DBMS concepts with NoSQL, Advantages of NoSQL like Elastic Scaling, Big Data, Goodbye DBAs', Economics/Cost, Flexible Data models. Non/ partial applicability of ACID (Atomicity, Consistency, Isolation, Durability), BASE Properties, CAP theorem, comparison to traditional RDBMS databases. Horizontal scalability, Benefits of NoSQL Databases compared to traditional Databases. Concept of UnSQL or Unstructured Query Language, Concept of Key Value & Tuple Store Databases, Concept of Graph Databases, Concept of Multimodel Databases	6
3	**Unit III: Encryption and Permissions in SQL Server 2012** Understanding permissions, Creating and Using database roles, using schemas for security, configuring cross-database security. Code and Data Encryption- Using service and database master keys, creating and using symmetric and asymmetric keys, creating and storing hash values, Authenticating stored procedure by signature	6
4	**Unit IV: Security of SQL Server 2012** User authorization, authentication and security, protecting data using permissions, roles, schemas, SQL firewall, web application	6

	firewall, securing dynamic SQL from injections, protecting SQL server from DoS and injection attacks.	
5	**Unit V: SQL Server Auditing** Auditing – Using the profiler to audit SQL server access, using DML trigger for auditing data modification, Using DDL triggers for auditing structure modification, configuring SQL server auditing, auditing and tracing user configurable events, policy based management, system centre advisor to analyze instances	6

Learning Outcomes:-

- Able to explain how security is ensured in database
- Learner will Justify the need for securing database in mitigating important vulnerabilities
- Learner will be able to create database application security models, database auditing models, application data auditing and practices of database auditing

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

Books Recommended:-

Text Books:

- Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008
- Database security by Silvana Castano, 2nd Edition, Pub: Addison-Wesley Professional, 2008
- Microsoft SQL server 2012 Security Cookbook by Rudi Bruchez, Pub: PACKT publishing, 1st ed; 2012

Reference Books:

- Handbook of database security: Applications and Trends Michael Gertz, Sushil Jajodia, Pub: Springer, 1st ed; 2008

- Implementing database security and auditing, Ron Ben-Natan, Pub: Digital Press, 1st ed; 2005

E-Resources:-

1, https://resources.infosecinstitute.com/database-security/#gref

2, https://docs.oracle.com/cd/B12037_01/server.101/b10743/security.htm

3, https://www.ibm.com/cloud/learn/database-security

Practical List:-

Hardware:

- I3/ I5 processor; 8GB RAM; 250GB HDD

Software:

- Windows 7/ 10; Windows server 2012 ISO, Ubuntu server ISO and Kali Linux ISO; Red Hat 7 ISO; Web browsers; VMware player; SQL server 2012 or 2014

Sr. No.	Practical
1	Configuring database security settings in SQL server
2	Understanding ports and services in SQL server
3	Foot printing a server using httprecon tool and performing vulnerability scanning on servers using OpenVas
4	Bypassing SQL database server and privilege escalation
5	Performing a security audit on SQL server using SQL Compliance manager
6	Creating SQL server authentication user and testing roles and privileges
7	Security and performance analysis of encrypted NoSQL database
8	Protecting SQL server from bruteforce attack

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Subject: Design & Analysis of Algorithm **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
3	**-**	**2**	**5**	**4**	**30**	**50**	**70**	**-**	**150**

Objectives: -

- To teach paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice.
- To make students understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms.
- To explain different computational models (e.g., divide-and-conquer), order notation and various complexity measures (e.g., running time, disk space) to analyse the

  Complexity/performance of different algorithms.
- To teach various advanced design and analysis techniques such as greedy algorithms,

  Dynamic programming & Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

Prerequisites: -

The readers should have basic knowledge of programming and mathematics. The readers should know data structure very well. Moreover, it is preferred if the readers have basic understanding of Formal Language and Automata Theory.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Role of Algorithms in Computing** Introduction: What is an Algorithm? Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Role of algorithms in computing, Algorithms as a technology. **Getting Started:** Fundamentals of the Analysis of Algorithm Efficiency, Asymptotic notation and Basic Efficiency Classes, Algorithm design.	9
2	**Brute Force Approaches** The method, Exhaustive search – Traveling salesman problem, Selection Sort and Bubble Sort, Sequential Search. **Sorting, Sets and Selection:** Merge sort, Quick sort, Bucket sort, Radix sort.	9
3	**Graphs** Graph abstract data type, Data structures for graphs, Graph traversals-BFS,DFS, Directed graphs, weighted graphs.	9
4	**Dynamic Programming** The method, Computing of Binomial Coefficient and Fibonacci Series, All pairs shortest path- Floyd's algorithm, Warshall algorithm.	9
5	**Greedy Algorithms- I** The greedy strategy, Greedy methods & optimization, Topological sort **Greed Algorithims-2:** Minimum cost spanning trees, Huffman codes, Single source shortest paths-Dijkstra's algorithm	9

Learning Outcomes:-

After successful completion of this course, student will be able to

- Analyse the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.

- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Teaching & Learning Methodology:-

- Lecture Explanation: Chalk Board/White Board/Smart Board
- Power Point
- Audio/Video Lectures
- Small Group Learning
- Use Of Exhibits And Displays
- Case Study
- Seminars/Expert Lecture
- Classes Outside The Class Rooms
- Role Play/ Drama
- Virtual Labs/Simulation
- Poster Presentation
- Assignment Sheet

Books Recommended:-

1. Data Structures, Algorithms and Applications in C++, SartajSahni,Second Edition. University Press 2005.
2. Introduction to the Design and Analysis of Algorithms, Anany Levitin, 2 nd Edition, Pearson Education 2007

E-Resources:-

- https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
- https://o6ucs.files.wordpress.com/2012/10/data-structures-algorithms-and-applications-in-c-by-sartraj-sahani.pdf

Practical List:-

Sr. No.	Practical
1	Write a Program to sort a set of elements by implementing Merge Sort

2	Implement Quick Sort
3	Write a Program to implement Breadth First Search method (BFS)
4	Write a Program to implement Depth First Search method (DFS)
5	Write a Program to implementing Prim's algorithm.
6	Write a Program to implement Kruskal's algorithm
7	Write a Program to implement Topological Sorting
8	Implement Dijkstra's algorithm.
9	Write a Program to sort a set of elements by implementing Radix sort
10	Write a Program to implement Floyd's &Warshall's Algorithm
11	Write a Program to compute Binomial Co-Efficient using dynamic programming
12	Write a Program to solve the Knapsack problem by dynamic programming

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Subject: Ethical Hacking **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
2	**-**	**2**	**4**	**3**	**30**	**50**	**70**	**-**	**150**

Objectives: -

- Acquire knowledge and skills needed for performing hacking process
- Understand the various hacking methodologies.
- Analyse the hacking process on different platforms and formal reporting writing process.

Prerequisites: -

The readers should have basic knowledge of information security.

Course outline:-

Sr. No.	**Course Contents**	**Number of Hours**
1	**Introduction to Ethical Hacking** Ethical Hacking Concepts , Scope, Types and Phases , Process of Malicious Hacking, Information Security Controls, Physical security, Incident Management, Vulnerability Assessment, Penetration Testing.	6
2	**Pre Hacking Phases**	6

	Foot printing, Reconnaissance, Scanning and Enumeration; Foot printing concepts, Foot printing methodology, Website Foot printing., Email Foot printing, Information Gathering, WHOIS Foot printing, DNS Foot printing , Foot printing through Social Engineering Foot printing tools. Foot printing Countermeasures. Overview of Scanning, Network, Scanning, methodology. Enumeration Concepts	
3	**System, Web and Network Hacking** System Hacking, Trojans and Black Box Vs White Box Techniques. Denial of Service, Botnets, Sniffers, and Hacking Web Servers: Session Hijacking, Web Application Vulnerabilities and Web Based Password Cracking Techniques, SQL Injection, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls	6
4	**Hacking Wireless Networks, Mobile Platforms** Wireless threats: Access control Attacks, Integrity Attacks, Rouge Access Point attacks, Ad Hoc Connection Attack, Jamming Signal attacks. Wireless Hacking Methodology: Foot Printing wireless Network, Wi-Fi discovery tools. Mobile Platform Attack: Vulnerabilities in Business environment, OWASP mobile top 10 risks, Security Issues – Mobile Apps, Hacking Android OS, Apple iOS, Windows phone OS, Jailbreaking, Mobile Device Management (MDM), Bring Your Own Device (BOYD), BOYD Risks, Mobile Security guidelines.	6
5	**Report writing & Mitigation** Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking	6

Learning Outcomes:-

After successful completion of this course, student will be able to

- Understand the basics of ethical hacking
- Elaborate on the hacking methodology
- Demonstrate the hacking process on different platforms
- Illustrate the various application of attacks on different wireless platforms
- Create the formal reports for the security attacks launched

Teaching & Learning Methodology:-

- Lecture Explanation: Chalk Board/White Board/Smart Board
- Power Point
- Audio/Video Lectures
- Small Group Learning
- Use Of Exhibits And Displays
- Case Study
- Seminars/Expert Lecture
- Classes Outside The Class Rooms
- Role Play/ Drama
- Virtual Labs/Simulation
- Poster Presentation
- Assignment Sheet

Textbooks:

1. CEH v9: Certified Ethical Hacker - Version 9 Study Guide by Sean-Philip Oriyano (Author), Wiley Publications , 2016

Practical List:-

Sr. No.	Practical
1	Perfroming Active and Passive resonnaissance.
2	Port Scanning information using nmap.
3	Vulnarability scanning using Wireshark.
4	Exploiting NetBIOS Vulnerability.

5	Creating and analyzing Virus.
6	Performing SQL Injection attack.
7	Creating and analyzing spoofed emails
8	Wi-fi Password Cracking.
9	Perfoming MITM attack.
10	Launching DDoS attack.

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Subject: Introduction to Cryptocurrency & Bitcoin **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
3	**-**	**-**	**3**	**3**	30	0	70	0	100

Objectives: -

In this course students will be able to understand the:

- To introduce the fundamentals of crypto currencies.
- To explain importance of decentralization in bitcoin
- To introduce the concepts of bitcoin Mechanics and Storage

This course will explain the mining and bitcoin mining concepts

Prerequisites: -Cryptography fundamentals

Course outline:-

Sr. No.	**Course Contents**	**Number of Hours**
1	**Introduction to Cryptography and Cryptocurrencies** Cryptographic Hash Functions, Hash Pointers And Data Structures, Digital Signatures, Public Keys As Identities, Cryptocurrencies, Bitcoin, Ether.	9

2	**Decentralization in Bitcoin** Centralization Versus Decentralization, Distributed Consensus, Consensus Without Identity Using A Block Chain, Incentives And Proof Of Work, Cost of mining.	9
3	**Bitcoin Mechanics and Altcoins** Bitcoin Transactions, Bitcoin Scripts, Applications Of Bitcoin Scripts, Bitcoin Blocks, The Bitcoin Network, Limitations And Improvements, Altcoins: History And Motivation, A Few Altcoins In Detail, Relationship Between Bitcoin And Altcoins.	9
4	**Storage and Use Bitcoins** Simple Local Storage, Hot And Cold Storage, Splitting And Sharing Keys, Online Wallets And Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets	9
5	**Bitcoin Mining and Anonymity** The Task Of Bitcoin Miners, Mining Hardware,Cpu Mining, Gpu Mining, Fmcg Mining, Asic Mining, Energy Consumption And Ecology, Mining Pools, Mining Incentives And Strategies,Anonymity Basics, How To Deanonymize Bitcoin, Mixing, Decentralized Mixing, Zerocoin And Zerocash	9

Learning Outcomes:-

At the end of this course students will be able to

- Understands fundamentals of crypto currencies
- Implement Cost estimation techniques and planning
- Implement the concepts of mining and bitcoin mining.
- Understands concepts of bitcoin Mechanics and Storage
- Understands the different coins like Altcoins

Teaching & Learning Methodology:-

The challenge that teaching and learning computer programming presents, has encouraged the design and implementation of various new and innovative computer programming teaching methods. The presented methods aim to improve the students' success rates by increasing their motivation and encouraging the greater self-engagement.

Books Recommended:-

- Bitcoin And Cryptocurrency Technologies- By Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder.
- Daniel Drescher, "Block Chain Basics", Apress; 1st edition, 2017
- Anshul Kaushik, "Block Chain and Crypto Currencies", Khanna Publishing House, Delhi.
- Imran Bashir, "Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Packt Publishing
- Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Block Chain", Packt Publishing
- Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, "Hands-On Block Chain with Hyperledger: Building Decentralized

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Subject: Network Security **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objectives: - This course provides in-depth coverage of network security which covers firewall, attacks, and mitigations of attacks, vulnerability management and practical process to mitigate attacks and vulnerability, learner will be able to manage and engineered SSL, PKI, VPN and MD algorithms, Security controls of CompTIA, CISCO, Microsoft

Prerequisites: - To familiarize the trainee with basic in-depth knowledge of various network fundamentals, security assets, firewall, encryption, key management is necessary, understanding of hardware is also required

Major Equipment:

- PC Hard ware, Networking Hardware, DTE/DCE, OFC, WI-IF

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**UNIT I: Introduction to Network Security** Introduction of Unit, Perimeter Security, Overview of Network Security, Access Control, Device Security, Security features on	6

	Switches, Firewall, Types of firewall, Attack vector and Mitigation techniques Access Management - Securing Management Access, Multifactor Authentication, Layer 2 Access Control, Wireless LAN (WLAN) Security and Network Admission Control (NAC).	
2	**UNIT II: Threats, Vulnerabilities And Attacks** Threat, Vulnerabilities – vulnerability assessment and vulnerability scanning, Attacks – Application Attack, Network Attack and Mitigating & Deterring Attacks, Network Security – Security through network devices, Security through Network Technologies and Security through Network Design Elements, Administering a Secure Network – Network, Administrative Principles and Securing Network Application, Conclusion of the Unit	6
3	**UNIT III: Network Security Management** Introduction of Unit, Secure Socket Layer (SSL) – Introduction to SSL, Open SSL basics, Problems with SSL, Cryptography, Message Digits Algorithms, Digital Signature and Public Key Infrastructure (PKI), Data Privacy – IPsec VPN, Dynamic Multipoint VPN (DMVPN), Group Encrypted Transport VPN (GET VPN), Secure Sockets Layer VPN (SSL VPN) and Multiprotocol Label Switching VPN (MPLS VPN). Conclusion of the Unit	6
4	**UNIT IV: Network Security Controls** Introduction of Unit, Network Intrusion Prevention, Overview of Intrusion Prevention System (IPS), Intrusion Detection System (IDS), Deploying IPS and IPS High Availability, Host Intrusion Prevention, Anomaly Detection and Mitigation, Conclusion of the Unit	6
5	**Unit V: Network Management** Introduction of Unit, Security Monitoring and correlation, Security Management - Security and Policy Management and Security Framework and Regulatory Compliance, Best Practices Framework, Case Studies, Conclusion of the Unit	6

Learning Outcomes:-

On successful completion of the course, students will be able to,

1. Relate fundamental concepts of information security with network and connectivity
2. Apply their understanding of network security in identifying common issues and propose suitable solutions
3. Articulate the importance of managing the network using policies, processes and framework for effective and efficient security.

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

Books Recommended:-

TextBooks:

1. Security + Guide to Network Security Fundamentals by Mark Ciampa, Course Technology, Cengage Learning
2. Network Security with OpenSSL by Pravir Chandra, Matt Messier, John Viega, O'Reilly

ReferenceBooks:

1. CCIE Professional Development Series Network Security Technologies and Solutions by Yusuf Bhaiji, CCIE No. 9305, CISCO Press

E-Resources:-

1, https://www.hitachi-systems-security.com/blog/top-7-cyber-security-resources-you-need-to-bookmark/

2, https://www.sans.org/security-resources/

3, https://www.cyberdegrees.org/resources/the-big-list/

4, https://www.cisco.com/c/en_in/products/security/what-is-network-security.html

5, comptia.org

Practical List:-

Sr. No.	Practical
1	Firewall Configuration
2	VPN Configuration
3	IDS Configuration
4	Router Security – I
5	Router Security – II
6	Traffic Monitoring using WireShark
7	Traffic Monitoring
8	Network Security risk assessment
9	Network security policies and standards
10	VLANs & Wireless LANs
11	Defence in Depth & DMZs
12	Network Security for BYODs

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Subject: Principles of Visualization **Semester: 5**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objectives: -

At the end of this course, you should be able to:

- Identify the need for Data Centre Virtualization
- Describe the components and features of vSphere 6.5
- Describe how VMware's products help solve business and technical challenges with regard to Data Center Virtualization

Prerequisites: - N/A

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Introduction** Introduction to Virtualization - Types of virtualization - Difference between cloud and virtualization - Physical infrastructure and virtual infrastructure - Virtualization approaches - Partitioning - Hosting - Isolation - Hardware independence - Virtual machine - Hypervisor - Types of hypervisor - Virtual machine manager - Types of hypervisor -	6

	Introduction to datacenter virtualization Esxi - Difference between Esxi and Esx - Versions of Esxi - Installation and configuration of Esxi 6.0 - vSphere 6.0	
2	**Components of vSphere 6.0** Components of VMware vSphere - vSphere 6.0: Overview and Architecture - Topology of vSphere 6.0 Data Center - vSphere 6.0 Configuration MaximumsvCenter Server - vCenter Server Features - Certificate Management - Alarms and Alerts - Monitoring Features - Template Management - Linked Mode Deployment - Storage Features in vSphere - Shared Storage - Storage Protocols - Datastores - Virtual SAN - Virtual Volumes - Networking Features in vSphere - Virtual Networking - Virtual Switches and its types	6
3	**Features of vSphere and NSX** vSphere Resource Management Features - vMotion - Distributed Resource Scheduler (DRS) - - Distributed Power Management (DPM) - Storage vMotion - Storage DRS - Storage I/O Control - Network I/O Control - vSphere Availability Features - vSphere Data Protection - High Availability - Fault Tolerance - vSphere Replication - Introduction to NSX.	6
4	**VSphere Solutions to Data Center Challenges and vSphere Security.** Challenges - Availability Challenges - Scalability Challenges - Management Challenges - Optimization Challenges - Application Upgrade Challenges - Cloud Challenges - Security - Describe the features and benefits of VMware Platform Services Controller - Configure ESXi host access and authorization - Secure ESXi - vCenter Server - and virtual machines - Upgrade ESXi and vCenter Server instances	6
5	**Resource optimization and resource management** Network Optimization - Configure and manage vSphere distributed switches - Migrate virtual machines from standard switches to distributed switches - Explain distributed switch features such as port mirroring -	6

	LACP - QoS tagging - and NetFlow - CPU Optimization - Explain the CPU scheduler operation - NUMA support - and other features that affect CPU performance - Monitor key CPU performance metrics - Memory Optimization - Explain ballooning - memory compression - and host swapping techniques for memory reclamation when memory is overcommitted - Monitor key memory performance metrics - Storage Optimization - Diagnose storage access problems - Configure VMware vSphere Flash Read Cache - Monitor key storage performance metrics\	

Learning Outcomes:-

They should be able to

- Installing and configuring the SDDC using VMware products.
- Implementing Fault tolerance and High availability for the Virtual machines
- Securing the Virtual environment.
- Resource Optimization and monitoring.

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

Books Recommended:-

Text Books:

1. Virtualization Essentials Paperback – 26 Apr 2012 by Matthew Portnoy - wiley publications
2. VMware Cookbook Paperback – 17 Jul 2012 by Troy - Shroff/O'Reilly; Second edition (17 July 2012)

Reference Book:

1. Mastering VMware vSphere 5.5 (SYBEX) Paperback – 2014 by Scott Lowe, Nick Marshall, Forbes Guthrie , Matt Liebowitz , Josh Atwell - Wiley (2014) edition.

E-Resources:-

Video Lectures

- http://labs.hol.vmware.com/HOL/catalogs/catalog/681
- http://docs.hol.vmware.com/
- http://www.ss.pku.edu.cn/vs/style/resources/Introduction%20to%20Virtualization.pdf

Practical List:-

S.NO	Name of Lab Exercise		
1	Installing and configuring ESXi 5.5/6.0 Server [On Premise]		
2	HOL-1810-01-SDC	Virtualization 101	1. Introduction to Management with vCenter Server 2. Introduction to vSphere Networking And Security
3	HOL-1810-01-SDC	Virtualization 101	3. Introduction to vSphere Storage
4	HOL-1808-01-HCI - vSAN v6.6 - Getting Started	vSAN v6.6 - Getting Started	1. vSAN 6.6 Setup and Enablement 2. vSAN Scale Out with Configuration Assist 3. vSAN All Flash Capabilities
5	HOL-1808-01-HCI - vSAN v6.6 - Getting Started	vSAN v6.6 - Getting Started	4. vSAN iSCSI Target 5. vSAN Encryption
6	HOL-1808-01-HCI - vSAN v6.6 - Getting Started	vSAN v6.6 - Getting Started	6. vSAN PowerCLI and ESXCLI 7. vSAN Stretched Cluster
	HOL-1803-01-NET - VMware NSX - Getting	VMware NSX	1. NSX Manager Installation and Configuration

7	Started		2. Logical Switching
8	HOL-1803-01-NET - VMware NSX - Getting Started	VMware NSX	3. Logical Routing 4. Edge Services Gateway
9	HOL-1811-04-SDC - vSphere Security - Getting Started	vSphere Security	1. Automating Password Complexity for ESXi Users 2. Forensic Security with vRealize Log Insight
10.	HOL-1811-04-SDC - vSphere Security - Getting Started	vSphere Security	3. VM Encryption and Encrypted vMotion 4. Secure Boot for Hosts and VMs 5. No-Cryptography Administrator Roles and Permissions

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Subject: Soft Skills and Aptitude **Semester: 5**

Listening & questioning skills and Aptitude

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
-	-	2	2	1	-	50	-	-	50

Objectives: -

To enhance the level of confidence in students and help them practice empathy, listen to others attentively and think more critically and logically before making decisions. To help students learn the techniques of enhancing and sharpening their logical reasoning skills.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Listening skills and Questioning Skills** Active listening, Barriers to listening, Asking effective questions, Being clear and succinct, Clarifying and summarising, practice sessions- role plays.	**(6 Hours)**
2	**Logical Reasoning - I** Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism, Blood Relations; concept of	**(9 Hours)**

	a statistical population and sample from a population; qualitative and quantitative data.	

Learning Outcomes:

Students will be able to overcome nervousness and stage fear at the end of the course. They will also develop better critical and logical thinking abilities; hence making them better personally and professionally. Students will be able to use their logical reasoning and thinking skills more effectively.

Reference Books:

1.Active Listening 101: How to Turn Down Your Volume to Turn Up Your Communication Skills, by Emilia Hardman, 2012

2. The Power of Communication: Skills to Build Trust, Inspire Loyalty, and Lead Effectively, by Helio Fred Garcia, 2012

3. Power Listening: Mastering the Most Critical Business Skill of All, by Bernard T. Ferrari, 2012

4. Fitly Spoken: Developing Effective Communication and Social Skills, by Greg S. Baker, 2011

5. The Secrets of Successful Communication: A Simple Guide to Effective Encounters in Business (Big Brain vs. Little Brain Communication), by Kevin T. Mc Carney, 2011.

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Subject: Cloud Web Services **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
3	**-**	**2**	**5**	**4**	30	50	70	-	150

Course Objective:

- To help students relate concepts of information security with Cloud computing
- To make it possible for students to learn how important principles of Security are implemented in virtualization and Cloud platforms in managing issues and challenges in Private Cloud deployment using Amazon and OpenStack platforms

Prerequisites:

- Knowledge of Operating Systems. As Amazon Cloud is a broad area, it is important to know the simple concepts relevant to operating systems, like Windows, Linux, etc.
- Understanding of Virtualization.
- Knowledge of Networking**.**
- Basic concepts of information security and Cloud computing

Course outline:-

Sr. No.	**Course Contents**	**Number of Hours**

1	**CLOUD COMPUTING AS A SERVICE** Cloud Computing, Software-as-a-service: SaaS, Platform-as-a-service: PaaS, Hardware-as-a-service: HaaS, Infrastructure-as-a-service: IaaS, Google Cloud Infrastructure, Google File System, Search engine, Map Reduce, Grid Computing, Amazon Web Services, REST APIs, SOAP API, Query API, User Authentication, Connecting to the Cloud, Open SSH Keys, Tunneling / Port Forwarding, Simple Storage Service – S3, Overview, Buckets, Objects, ACL, Logging, Signed URI, S3 Applications, Elastic Cloud Compute - EC2.	9
2	**UNIT II NETWORKING BASICS** Overview, Keypairs, Network Types, LAN, Gateways and Router, IP Classes and Subnets, CIDR, Utilities, Instances Management, Image Management, Security groups, Amazon Elastic Block Storage - EBS, Ubuntu in the Cloud, Installation, Utilities, File system, Shell.	9
3	**UNIT III: PROGRAMMING AND CONTROL STRUCTURES** Programming, Control Structures, Event based Init Daemon, Apache Instances in EC2, Introduction, Installation and Running, Testing server and content, Configuring Apache, Directives, Virtual hosts, Amazon Simple Queue Service, Amazon Simple Notification Service, Amazon Simple DB, Amazon Relational Database Service, Mysql Server Replication in Cloud, Mysql Database, Batch mode, Mysql Apache Integration, Storage Engines, Replication Basics, Availability and scalability, Caching, Proxy.	9
4	**UNIT IV BACKUP AND RECOVERY** Backup and Recovery, Database Sharding, EC2 Applications, Web application design, Focus on Search Engine, Security, Firewall, Data, Network and Host, AWS EC2 Capacity Planning, Apache Servers, Mysql Servers.	9
5	**UNIT V AMAZON CLOUD AND OPEN STACK** Amazon Cloud Watch, Monitoring Tools, Amazon Cloud Front,	9

	Youtube, Amazon Elastic Load Balancing, Cluster Balancing, Amazon Auto Scaling, Apache Scaling, Mysql Scaling, Amazon Virtual Private Cloud, DHCP, DNS, NFS, NIS, Virtualization, Private Cloud for Enterprise, Hybrid Cloud for Enterprise, OpenStack Cloud platform, architecture, Private Cloud deployment, SELinux policies, Security features	

Learning Outcomes:-

On successful completion of the course, students will be able to,

- Analyze the private cloud setup with its vulnerabilities and applications using different architectures.
- Design different workflows according to requirements and apply map reduce programming model.
- Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms
- Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds
- Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application
- Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

Books Recommended:-

Text Books:

TEXT BOOKS:

1. Cloud Computing: Principles and Paradigms, Editors: RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011

2. Visible Ops Private Cloud: From Virtualization to Private Cloud in 4 Practical Steps, Andi Mann, Kurt Milne, Jeanne Morain, IT Process Institute, Inc.; first edition (April 8, 2011)

3. OpenStack Cloud Security by Fabio Alessandro Locati, Packt Publishing Limited (28 July 2015)

REFERENCE BOOK:

1. Cloud Computing Explained: Implementation Handbook for Enterprises, John Roton, Recursive Press (November 2, 2009)

E-Resources:-

1 http://fit.mta.edu.vn/files/DanhSach/_R_Book_HP_cloudcomputingfordummies.pdf

List of Experiments:

1. AWS root and user account creation using AWS management console.
2. Setting up monthly billing alerts using SNS
3. Launching EC2 instance and accessing it through SSH using putty
4. Demonstrating cross region replication through EBS snapshot.
5. Demonstrating bucket creation and version control with the help of S3.
6. Creating and hosting static web site using S3 bucket.
7. Demonstrating Elastic Load Balancer with the help of 4 EC2 instances.
8. Configuration of Database engine using Amazon RDS
9. Multi region deployment of RDS database engine
10. Demonstrating Amazon SNS service.
11. Creating your own VPC, subnets, route tables and security groups.
12. Demonstrating the configuration of NAT gateway.

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Swarrnim Institute of Technology
Department of Computer Engineering
Bachelor of Technology (B. Tech) - Computer Engineering
(Cloud Technology & Information Security)
Code: _____

Subject: Defense in Depth **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objectives:-To help students relate concepts of threat and risk management, vulnerability assessment and penetration testing, vulnerability management. To make it possible for students to learn how important principles of identity access and management.To facilitate students to understand how security architecture and controls.

Prerequisites:-Basic concepts of information security and computer networks.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Threat Management** Identify Security Control Types, Explain the Importance of Threat Data and Intelligence, Classify Threats and Threat Actor Types, Utilize Attack Frameworks and Indicator Management, Utilize Threat Modeling and Hunting Methodologies. Analyzing Security Monitoring Data (Network, Appliance, Endpoint, Email). Collecting and Querying Security Monitoring Data, Configure Log Review and SIEM Tools,	6

	Analayze and Query Logs and SIEM Data.	
2	**Risk and Vulnerability Management** Identify Digital Forensics Techniques, Anlayze Network-related IoCs, Analyze Host-related IoCS, Analyze Application-Related IoCs, Applying Incident Response Procedures. Applying Risk Mitigation and Security Frameworks. Analyze Output from Enumeration Tools, Configure Infrastructure Vulnerability Scanning Parameters, Analyze output from infrastructure vulnerability scanning, Mitigate vulnerability Issues.	6
3	**Penetration Testing** Planning and Scoping Penetration Tests, Conducting Passive Reconnaissance, Performing Non-Technical Tests, Conducting Active Reconnaissance (Scan Networks, Enumerate Targets, Scan for Vulnerabilities), Analyzing Vulnerabilities, Penetrating Networks, Exploiting Host-based Vulnerabilities (Windows and Linux), Testing applications, Post-Exploit Tasks, Analyzing and Reporting Pentest Results.	6
4	**Security Architecture and Design** Implementing a Secure Network Architecture Concepts, Configure Network Access Controls, Secure Switching Infrastructure, Secure Routing and NAT Infrastructure, Configure Firewalls and Proxies, Configure Load Balancers, Configure Intrusion Detection/Prevention Systems, Data Loss Prevention (DLP) Systems, Logging and SIEM Systems.	6
5	**Identity and Access Management** Compare and Identity and Authentication Concepts, Configure Authentication Protocols, Implement Multifactor Authentication, Configure Authorization and Directory Services, Access Management Controls, Differentiate Account management Practices, Account Auditing and Recertification.	6

Learning Outcomes:-

After learning the course the students should be able to:

- Detect various types of compromise and have an understanding of penetration testing and vulnerability scanning concepts.
- Configure identity and access services, as well as management controls
- Implement and summarize risk management best practices and business impact

E-Resources

1. Cyber Security Analyst+ by ComPTIA
2. PenTest+ by ComPTIA
3. Security+ by ComPTIA

Practical List:-

Practical
1. Design and implementation of Security Architecture for lab environment
2. Configuration secure network architecture and securing network components
3. Building Security Operations Centre (SOC)
4. Understanding multi-layer defense-in-depth Security Architecture
5. Design and Implement Secure Network Architecture Concepts
6. Implement Secure System design
7. Implement Security Implications of embedded systems (SCADA/ICS, SoC, HVAC)
8. Install and configure identity and access services a. LDAP b. Kerberos c. PAP d. SAML e. OpenID Connect f. OAUTH g. NTLM h. Secure token i. NTLM
9. Implement identity and access management controls a. Access controls models (MAC, DAC, ABAC)

b. Biometric factors
c. Tokens
d. Certificate-based authentication
e. File system security
f. Database security

10. Given a scenario, differentiate common account management practices.
    a. Account types
    b. General Concepts
    c. Account policy enforcement
11. Given a scenario, conduct information gathering using appropriate techniques
    a. Scanning
    b. Enumeration
    c. Packet crafting
    d. Packet inspection
    e. Fingerprinting
    f. Cryptography
    g. Eavesdropping
12. Given a scenario, perform a vulnerability scan.
    a. Credentialed vs. non-credentialed
    b. Types of scan
    c. Application scan
13. Analyze vulnerability scan results. (False positives)
14. Given a scenario, exploit network based vulnerabilities
    a. NETBIOS,
    b. SMB exploits
    c. SNMP exploits
    d. FTP exploits
    e. Man-in-the-middle attacks
15. Given a scenario, exploit application-based vulnerabilities
    a. Injections
    b. Authentication

c. Authorization
d. XSS
e. CSRF
f. Security Misconfiguration

16. Given a scenario, exploit local host vulnerabilities
    a. OS vulnerabilities
    b. Unsecure service and protocol configurations
    c. Privilege escalation
    d. Default account settings

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Code: _____

Subject: Digital Forensic Investigation **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**Pr**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
2	**-**	**2**	**4**	**3**	30	50	70	-	150

Course Objective:

- To understand how computer forensics is used as a powerful technique in digital investigation.
- To choose the process, various steps, tools and techniques involved in computer forensics.
- To appraise the need for understanding legal aspects of computer forensic investigation and need for meticulous documentation.
- To learn the various methods to investigate cybercrime and associated cyber laws
- To explore analysis of web server in a forensically sound manner.

Prerequisites:

- Knowledge of Operating Systems and information security
- Understanding of Ethical hacking
- Knowledge of Networking**.**

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Computer Forensics** Introduction to Computer Forensics, Forms of Cyber Crime, First Responder Procedure- Non-technical staff, Technical Staff, Forensics Expert and Computer Investigation procedure.	9
2	**Storage Devices & Data Recovery Methods** Storage Devices- Magnetic Medium, Non-magnetic medium and Optical Medium. Working of Storage devices-Platter, head assembly, spindle motor. Data Acquisition, Data deletion and data recovery method and techniques.	9
3	**Forensics Techniques** Windows forensic, Linux Forensics, Mobile Forensics, Steganography, Application Password cracking-Brute force, Dictionary attack, Rainbow attack. Email Tacking – header option of SMTP, POP3, IMAP.	9
4	**Cyber Law** Corporate espionage, Evidence handling procedure, Chain of custody, Main features of Indian IT Act 2008 (Amendment).	9
5	**Forensic Analysis of Web Server** Developing , administering and managing a remotely hosted web site, Use of HTML browsers on ports other than 80, Control Panel – Forensics traces left on web site admin machine, traces left on hosting servers. Anti-Forensics Techniques – Methods used to thwart subsequent forensics analysis, Forensics traces left, Approaches that may be used to reduce the effectiveness of these methods. Internet and Web attack forensics.	9

Learning Outcomes:-

On successful completion of the course, students will be able to,

- Explain the importance of computer forensic in achieving the goals of information security
- Identify steps involved in recovering data stored in various devices and various techniques used in windows, linux, network and web application forensics
- Justify the need for meticulous documentation in computer forensics
- Apply the rationale for having an adequate legal framework when dealing with computer forensics
- Explore the kind of crime associated with different web servers and create documentation.

Teaching & Learning Methodology:-

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

Books Recommended:-

Text Books:

1. Computer Forensics: Computer Crime Scene Investigation by John Vacca, Laxmi Publications, 1st; 2015.
2. Digital Forensic: The Fascinating World of Digital Evidences by Nilakshi Jain, et.al, Wiley, 1st ed; 2016.
3. Windows Registry analysis by Harlan Carvey, 2010
4. The Art of Memory Forensics by Michael Hale Ligh, Andrew Case, Jamie Levy, Aron Walters

References:

1. Hacking Exposed Computer Forensics – Aaron Philipp, David Cowen, Chris Davis, Pub:

McGraw hill-2011

2. Malware Forensics Field Guide for Windows System , CameroH.Malin, Eoghan Casey, James M.Acuilina, Curtis W.Rose, Syngress, 2012 Books
3. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics by John Sammons, Syngress, 2nd ed; 2014.
4. Cyber Forensics in India: A Legal Perspective by Nishesh Sharma, Universal Law Publishing – an imprint of LexisNexis; First 2017 edition.

List of Experiments:

1. Evidence gathering using Dos and Sysinternals commands.
2. To gather information about the suspect's system using a Live CD HELIX without altering the state of the suspects system.
3. Creating & Investigating the Bit Stream Image with Cyber check suite & Helix.
4. To recover delete files and lost partitions using any predefined tool.
5. Analysing Windows registry.
6. Application password cracking.
7. To hide the document in image file using Steganography methods.
8. Analysing Steganographed Image using Hex –Editor
9. Event logger analysis in Windows
10. Analysing the email headers
11. Exploration and analysis of web servers.
12. Imaging and analyzing of mobile phone devices.

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Subject: Infrastructure Automation **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	-	70	-	100

Objectives:-

- Students learn the concepts of chef and its cookbooks as well as related servers and its implementation.
- Students will explore the concepts of puppet infrastructure and its associated resource and manifests.

Prerequisites:-Basic concepts of information security and computer networks.

Course outline:-

Sr. No.	Course Contents	Number of Hours
I	**INTRODUCTION TO CHEF:** Idempotency/convergence - test & repair model - Common resources and their actions- Default actions- The ':nothing' action - The 'supports' directive - The 'not_if' and 'only_if' directives - Resource extensibility -RECIPES: What a recipe is - Importance of the	9

	resource order - How to use 'include_recipe' - What happens if a recipe is included multiple times in a run_list - The 'notifies' and 'subscribes' directives.	
II	**COOKBOOKS AND CHEF SERVER:** Cookbook contents - Naming conventions - Cookbook dependencies - The default recipe - How the Chef server acts as an artifact repository - How the Chef server acts as an index of node data - Chef solo vs Chef server - Chef server's distributed architecture - Scalability.	**9**
III	**CHEF CLIENT:** The function of Chef client vs the function of Chef server - What 'why-run' is - How to use '--local-mode' - How the Chef client and the Chef server communicate - The Chef client configuration - What a node is - What a node object is - How a node object is stored on Chef server - How to manage nodes - How to query nodes - How to name nodes.	**9**
IV	**PUPPET INFRASTRUCTURE:** Introduction To Configuration Management - Importance of puppet - How To Access Your Working Files - Puppet Agents - Puppet Masters Systems Orchestration - Cross Platform Puppet.	**9**
V	**RESOURCE AND MANIFESTS:** Introduction To Puppet Run Cycle - Gathering System Facts - Node Matching And Catalogue Compilation - Puppet Resources - How To Define System Resources - Applying A Simple Puppet Manifest - Puppet Types - The Package File Service Pattern - Applying Conditional - - Logic In Puppet - Fact Conditionals - Choosing A Course Of Action.	**9**

Learning Outcomes:-

After learning the course the students should be able to:

- To understand the concept of DevOps.
- Realize the infrastructure automation in cloud.
- Managing the services with code.
- Implementing Code as a service using puppet and chef.
- Explore how to create puppet infrastructure.

Books Recommended:-

- Managing Infrastructure with Puppet Paperback – 29 Jun 2011 by James Loope.
- Chef Cookbook Paperback – Import, 3 Feb 2017 by Matthias Marschall (Author).
- DevOps for Beginners: Hands-on Guide Kindle Edition by David Johnson – 2016 edition.

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Subject: Introduction to Data Science **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	0	70	0	100

Objectives:-

- Apply quantitative modelling and data analysis techniques to the solution of real world business problems, communicate findings, and effectively present results using data visualization techniques.
- Recognize and analyse ethical issues in business related to intellectual property, data security, integrity, and privacy.

Prerequisites:-NA

Course outline:-

Sr. No.	Course Contents	Number of Hours
I	**INTRODUCTION TO CHEF:** Idempotency/convergence - test & repair model - Common resources and their actions- Default actions- The ':nothing' action - The 'supports' directive - The 'not_if' and 'only_if' directives - Resource extensibility	9

	-RECIPES: What a recipe is - Importance of the resource order - How to use 'include_recipe' - What happens if a recipe is included multiple times in a run_list - The 'notifies' and 'subscribes' directives.	
II	**COOKBOOKS AND CHEF SERVER:** Cookbook contents - Naming conventions - Cookbook dependencies - The default recipe - How the Chef server acts as an artifact repository - How the Chef server acts as an index of node data - Chef solo vs Chef server - Chef server's distributed architecture - Scalability.	**9**
III	**CHEF CLIENT:** The function of Chef client vs the function of Chef server - What 'why-run' is - How to use '--local-mode' - How the Chef client and the Chef server communicate - The Chef client configuration - What a node is - What a node object is - How a node object is stored on Chef server - How to manage nodes - How to query nodes - How to name nodes.	**9**
IV	**PUPPET INFRASTRUCTURE:** Introduction To Configuration Management - Importance of puppet - How To Access Your Working Files - Puppet Agents - Puppet Masters Systems Orchestration - Cross Platform Puppet.	**9**
V	**RESOURCE AND MANIFESTS:** Introduction To Puppet Run Cycle - Gathering System Facts - Node Matching And Catalogue Compilation - Puppet Resources - How To Define System Resources - Applying A Simple Puppet Manifest - Puppet Types - The Package File Service Pattern - Applying Conditional - - Logic In Puppet - Fact Conditionals - Choosing A Course Of Action.	**9**

Learning Outcomes:-

After learning the course the students should be able to:

- To understand the concept of DevOps.
- Realize the infrastructure automation in cloud.
- Managing the services with code.
- Implementing Code as a service using puppet and chef.
- Explore how to create puppet infrastructure.

Books Recommended:-

- Managing Infrastructure with Puppet Paperback – 29 Jun 2011 by James Loope.
- Chef Cookbook Paperback – Import, 3 Feb 2017 by Matthias Marschall (Author).
- DevOps for Beginners: Hands-on Guide Kindle Edition by David Johnson – 2016 edition.

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Subject : Introduction to Internet of Things **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	0	70	0	100

Objectives:-

- Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design and develop IoT Devices.

Prerequisites:-NA

Course outline:-

Sr. No.	Course Contents	Number of Hours
I	**Introduction to IoT** M2M to IoT, The Vision, Introduction, From M2M to IoT, M2M towards IoT, the global context, A use case example, Differing Characteristics. M2M to IoT – A Market Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The International driven global value chain and global information monopolies.	9

II	**IoT Technology Fundamentals and Architecture** M2M and IoT Technology Fundamentals**,** Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, M2M and IoT Analytics, Knowledge Management. IoTArchitecture,State of the Art – Introduction, State of the art, **Architecture Reference Model,** Introduction, Reference Model, and architecture.	**9**
III	**Cloud Computing Basics** Cloud computing components, Infrastructure, services, storage applications, database services – Deployment models of Cloud, Services offered by Cloud, Benefits, and Limitations of Cloud Computing – Issues in Cloud security, Cloud security services and design principle.	**9**
IV	**Privacy, Security, and Governance** Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT,Data, Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security	**9**
V	**IoT Applications** Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.	**9**

Learning Outcomes:-

After learning the course the students should be able to:

- Understand the application areas of IOT
- Discover the revolution of Internet in Mobile Devices, Cloud and Sensor Networks

- Understand building blocks of Internet of Things and characteristics.
- Elaborate various privacy and security issues.
- Develop IoT applications for industry and for real life applications.

Books Recommended:-

1. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to. Connecting Everything”, 1st Edition, Apress Publications, 2013
2. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, “Cloud Computing: A Practical Approach”, Tata McGraw Hill Edition, Fourth Reprint, 2010.
3. Kris Jamsa, “Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and more”, Jones and Bartlett Learning Company LLC, 2013.
4. “Internet of Things Applications, From Research and Innovation to Market Deployment ” By OvidiuVermesanand Peter Friess, ISBN:987,87,93102,94,1, River Publishers

E-Resources:

1. https://www.meshdynamics.com/documents/Rethinking,Internet,Of,Things,Book.pdf

SWARRNIM STARTUP & INNOVATION UNIVERSITY
Swarrnim Institute of Technology
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Bachelor of Technology (B. Tech) - Computer Engineering
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Code: _____

Subject: Linux Security Forensics **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	Pr	Total		Th	Pr	Th	Pr	
2	-	2	4	3	30	50	70	-	150

Objective:

1. To introduce the basics of linux security and associated terminologies.
2. To understand the types on communications on data networks.
3. To gain knowledge of wireless frequency bands and related wireless attacks.
4. To explore the knowledge of interpreting various web based attacks.
5. To simulate the concepts on netfilter and perform live acquisition process.

Course outline:-

Sr. No.	Course Contents	Number of Hours
I	**Introduction To Linux Security** Comprehensive Constraints, Elements of Security, Interactive Controls, Process Controls, Local Access Control-Console Access, Privilege Escalation, File Permissions and Attributes, Volatile Data..	6
II	**Data Networks Security**	6

	Network Visibility, Systems Profiling, Network Architecture, Covert Communications and Clandestine Administration; Voice over IP-VoIP Attack Taxonomy Network Attacks, System Attacks, Signalling Attacks, Transport Attacks.	
III	**Wireless Attacks** Wireless Networks-The State of the Wireless, Wireless Hacking Physics, RF Spectrum Analysis, Exploiting 802.11, The Hacker Way, Wireless Auditing Activities and Procedures, Bluetooth Profiles, Entities on the Bluetooth Protocol Stack..	**6**
IV	**Web Application Hacking** Enumeration, Access and Controls Exploitation, Insufficient Data Validation, Web 2.0 Attacks, Trust Manipulation, Man-in-the-Middle, Web Infrastructure Attacks, Mail Services-SMTP Basics, SMTP Attack Taxonomy, Alteration of Data or Integrity, Denial of Service or Availability.	**6**
V	**Net Filter** Net Filter Enhancements, Enhanced Wireless Stack, File System Enhancement, Additional Kernel Resources, The Forensic Workstation, Live Investigation/Acquisition, Post Mortem Analysis, Handling Electronic Evidence.	**6**

Text Books:

1. UNIX and Linux Forensic Analysis DVD Toolkit Chris Pogue, Cory Altheide, Todd Haverkos

Course Outcomes:

On successful completion of the module students will be able to:

- Understand the basics of Linux Security
- Illustrate the various data network security attacks
- Explore different wireless attacks
- Demonstrate the various web application attacks
- Elaborate the process of live acquisition and evidence handling process

List of Experiments

1. Exploit operating system Client, side vulnerability
2. Crafting a packet to perform ICMP packet spoofing
3. Write a script to check if an ftp server allows anonymous logins
4. Demonstration of transport attacks.
5. Case studies on CIA.
6. Configuring the DoS attack.
7. Perform a bit stream image of linux OS.
8. Perform a post mortem analysis on linux OS after launching any MITM attack.

SWARRNIM STARTUP & INNOVATION UNIVERSITY
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Code: _____

Subject: Storage & Datacenter **Semester: 6**

Teaching & Evaluation Scheme:-

Teaching Scheme				**Credits**	**Evaluation Scheme**				
					Internal		**External**		**Total**
Th	**Tu**	**P**	**Total**		**Th**	**Pr**	**Th**	**Pr**	
3	**-**	**-**	**3**	**3**	30	-	70	-	100

Objectives:-

- To impart the basic concepts of Storage systems and Datacenter environment.
- To understand concepts about RAID techniques.
- To understand basic concepts about NAS and SAN.
- To understanding about taking backup and restoring the data with the help of Business Continuity and Disaster Recovery concepts and tools.
- To understand about Data Center Consolidation and Clustering.

Prerequisites:-Basic concepts of information security and computer networks.

Course outline:-

Sr. No.	**Course Contents**	**Number of Hours**
I	**Introduction to Storage System** **Introduction to Information Storage:** Information Storage, Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing	9

	Data Center Environment: Application, Database Management System (DBMS), Host (Compute), Connectivity, Storage, Host Access to Data, Direct-Attached Storage, Storage Design Based on Application **Data Protection (RAID):** RAID Implementation Methods, RAID Array Components, RAID Techniques, RAID Levels, RAID Impact on Disk Performance, RAID Comparison.	
II	**Storage Networking Technologies** **Network-Attached Storage:** General-Purpose Servers versus NAS Devices, Benefits of NAS, File Systems and Network File Sharing, Components of NAS, NAS I/O Operation, NAS Implementations, NAS File-Sharing Protocols, Factors Affecting NAS Performance , File-Level Virtualization. **Fibre Channel Storage Area Networks:**Fibre Channel Overview, The SAN and Its Evolution, Components of FC SAN, FC Connectivity, Switched Fabric Ports, Fibre Channel Architecture, Fabric Services, Switched Fabric Login Types, Zoning, FC SAN Topologies, Virtualization in SAN. **IP SAN and FCoE**: iSCSI, FCIP, FCoE	9
III	**Backup and Disaster Recovery** **Introduction to Business Continuity:** Information Availability, BC Terminology, BC Planning Life Cycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions. **Backup and Archive:** Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Architecture, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Targets, Data Deduplication for Backup, Backup in Virtualized Environments, Data Archive, Archiving Solution Architecture.	9
IV	**Data Center Consolidation** **Reasons for Data Center Consolidation:** Reasons for Data	9

	Center Consolidation, Consolidation Opportunities. **Data Center Consolidation Phases:** Phase 1: Study and Document the Current Environment, Phase 2: Architect the Target Consolidated Environment, Phase 3: Implement the New Architecture, Phase 4: Control and Administer the Consolidated. **Best Practices in IT:** Defining Best Practices, Deploying Best Practices, Benefits of Best Practices, Systems Management Best Practices, Server Cluster Best Practices, Data Storage Best Practices, Network Management Best Practices, Documentation Best Practices, Network Diagram Documentation, Documentation Formats.	
V	**Data Center Clusters** **Cluster Architecture:** Asymmetric Two-Node Clusters, Symmetric Two-Node Clusters, Complex Cluster Configurations, Failover Policies, Best Practices. **Cluster Requirements:** Required Hardware Cluster Components, Cluster Software Requirements, What Happens During Service Failover, Cluster Installation Checklist. **Designing Cluster-Friendly Applications**: Automating Operations, Controlling Application Failover Time, Reducing Data Loss During Failover, Minimizing Application Failures, Designing Node-Independent Applications, Minimizing Planned Downtime, Restoring Client Connections.	9

Learning Outcomes:-

After learning the course the students should be able to:

- Understand the various Storage devices and technologies
- Summarize the advantages and functionality of NAS and SAN.
- Appreciate knowledge on Backups and Disaster Recovery.
- Describe Data Center Consolidation and its phases.
- Appreciate knowledge on design and analysis of Cluster Architecture.

Books Recommended:-

- Information Storage and Management (Storing Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments) 2nd Edition by SomasundaramGnanasundaramAlok Shrivastava.
- Administering Data Centers: Servers, Storage, and Voice over IP By Kailash Jayaswal ISBN-13: 978-0471771838.
- Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, ISCSI, INFINIB and FOCE by Ulf Troppens.
- Storage Management in Data Centers: Understanding, Exploiting, Tuning, and Troubleshooting Veritas Storage Foundation by Volker Herminghaus and Albrecht Scriba.
- Blade Servers and Virtualization: Transforming Enterprise Computing While Cutting Costs by Barb Goldworm and Anne Skamarock.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF BIOTECHNOLOGY

BIOTECHNOLOGY -501

CODE : 53010501

B.Sc. 5TH SEMESTER

Teaching & Evaluation Scheme :-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	30	20	70	30	150

Objectives:- To provide basic knowledge Molecular Techniques

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1.	**Electrophoresis**- Principle, methodology and factors affecting protein and nucleic acid electrophoresis. PCR- Introduction, Principle, basic methodology, factors affecting and application, Site-directed mutagenesis.	8
2.	Nucleic acid hybridization, colony and plaque hybridization, Southern, Northern and Western blotting, Dot-Blot, differential screening. In situ hybridization, FISH (radioactive and non radioactive detection of hybridization), Autoradiography.	8

3.	Molecular markers- RFLP, RAPD, AFLP, SNP, Satellite DNA. DNA Fingerprinting- process and its application. Construction of c-DNA library & genomic DNA library.	**8**
4.	DNA sequencing- chain termination, chemical cleavage and automated. DNA Foot printing- types and application. In vitro transcription and in vitro translation, various systems and application.	**8**

Learning Outcomes:

At the end of the course the student would have basic knowledge of molecular techniques.

Teaching & learning Methodology:

- Use of audiovisual aids
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- From genes to clones –Ernst winnaker
- Genetic engineering – Old & Primrose
- Biotechnology and Genomics – PK Gupta
- A text of biotechnology – RC Dubey

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY

BIOTECHNOLOGY -502

CODE : 53010502

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	30	20	70	30	150

Objectives: - To provide basic knowledge Environmental of Biotechnology

Prerequisites:-

Course outline: - Environmental Biotechnology

Sr. No.	Course Contents	Number of Hours
1.	Types of pollutions (Air, water& land). Water pollution-common pollutants, treatment of industrial and domestic waste water (primary, secondary and tertiary treatment) BOD, COD, TOC, Colour, Odour, alkalinity & acidity	10
2.	Bioleaching of metals (copper) General properties of microorganisms involved in it. Types of bioleaching-Heap, Dump & in situ. Mechanism of leaching direct, Indirect and galvanic. Significance of bioleaching	8

3.	Biomagnification, Biodegradation of xenobiotics(DDT, nitro aromatic compounds), introduction and application bioremediation & phytoremediation.	**8**
4.	Biosensor: types, principle, applications and limitations. Bioplastic- Introduction, technology and applications	**8**

Learning Outcomes:

At the end of the course the student would have basic knowledge of microbiology techniques and bacteria.

Teaching & learning Methodology:

- Use of audiovisual aids
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Environmental Pollution Control Engineering – CS Rao
- Industrial Microbiology –Whitaker
- Industrial Microbiology –AH Patel
- A text book of biotechnology – RC Dubey

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY

BIOTECHNOLOGY -503

CODE : 53010503

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	30	20	70	30	150

Objectives:- To provide basic knowledge Bio-insrumentation

Prerequisites:-

Course outline:- Bio-insrumentation

Sr. No.	Course Contents	Number of Hours
1.	**COLORIMETERY AND SPECTROPHOTOMETRY** Principle, Instrumentation Method and Application of UV-Visible Spectroscopy Atomic Absorbtion Spectroscopy Flame Photometry Nephlometery Infra Red Spectroscopy Mass Spectroscopy for Protein Characterization & Identification	10
2.	**ELECTROPHORESIS AND CENTRIFUGATION** **Electrophoresis** Principle, Support Media, Methods and Applications of electrophoresis Separation of protein and nucleic acids (PAGE, SDS-	12

	PAGE, Agarose and IEF) **Centrifugation :** Basic Principles of Sedimentation Methods and Applications of Density Gradient Centrifugation (Rate Zonal and Isopycnic), Ultracentrifugation (Introduction and Applications)	
3.	**CHROMATOGRAPHY** Introduction, Definition and Types of Chromatography General Principles Underlying Chromatographic techniques. Working and Applications of :Thin Layer Chromatography, Adsorption cromatography,Ion Exchange Chromatography,Molecular Sieve Chromatography,Gas Liquid Chromatography,HPLC,Affinity Chromatography	**10**
4.	**Bioinformatics:** Definition.Branches of Bioinformatics. Aim of Bioinformatics. Scope of Bioinformatics. **Databases:** Types of Databases, Database retrieval system. **Biosensors:** Their Principle, Method and Applications. Radioactivity.Nature of Radioactivity, Types of radioactive decay.Safety aspects of Radioactivity. Applications of Radioactivity in Biological Sciences	**12**

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Bio-insrumentation

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Biotechnology and Genetic Engineering - P.K. Gupta
- Biophysical chemistry - principles and techniques - Upadhyay, Upadhyay and Nath
- Instrumental methods of chemical analysis - Chatwal and Anand
- Principles and techniques of Practical biochemistry - Wilson and Walker

- Biochemistry - Zubay, G. L.
- Bioinformatics: Principles & Applications - Ghosh & Mallick

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY

BIOTECHNOLOGY -504

CODE : 53010504

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	30	20	70	30	150

Objectives:- To provide basic knowledge of Metabolism.

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1.	**Energy metabolism:** Introduction to metabolism, Methods of studying intermediary metabolism ATP (Structure, generation, & role, Modes of ATP generation in bacteria Oxidative phosphorylation - ETC - components and organization. Mechanism of Oxidative phosphorylation, ATP synthase Fermentation and substrate level phosphorylation Bacterial photophosphorylation	12
2.	**Carbohydrate metabolism** **Degradation:** EMP, PP & ED pathway of glucose catabolism.	12

	Reaction and energies of TCA cycle and its importance. Amphibolic nature of TCA, Anapleuretic reaction and glyoxylate cycle. - Regulation of glycolysis and TCA cycle. **Biosynthesis:** Gluconeogenesis. CO_2 fixation - Calvin Benson cycle.	
3.	**Lipid metabolism :** **Fatty acid degradation**: Beta-oxidation of saturated fatty acid - palmitic acid and its energetics Oxidation of mono unsaturated fatty acids - olic acid. Oxidation of Polyunsaturated fatty acid - linoleic acid - α and ω oxidation of fatty acid **Biosynthesis of fatty acid:** Biosynthesis of saturated fatty acids Biosynthesis of mono unsaturated fatty acids - aerobic and anaerobic pathway Biosysnthesis of poly unsaturated fatty acids - archidonic acid.	**10**
4.	**Biosynthesis of Amino acids**: Aspartate family and Aromatic family. **Biosynthesis of Peptidoglycan:** **Catabolism of Amino acids:**Transamination, oxidative deamination, - Urea cycle , Stickland reaction.	**10**

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Metabolism.

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Principles of Biochemistry - Lehninger ,Nelson and Cox ,4th edition
- Biochemistry - Zubay, G. L.
- Biochemistry - Stryer, L.
- General Microbiology - Stanier, R. Y.
- Principles of Microbiology - Ronald M. Atlas

- Biochemistry - Voett and Voett
- Microbiology - Prescott, L. M.
- Microbiology Vol. I & II - Powar & Daginawala
- Biochemistry - S. Satyanarayana

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

Chemistry-501
CODE : 53020501
B.Sc. 5th Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	50	50	-	150

Objectives:- To provide basic knowledge Chemistry

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**(A) Carbohydrates** Disaccharides, structure of (+) maltose, (+) cellobiose, (+) lactose and (+) sucrose. **(B) Purine and Pyrimidines** **(i)** Purines – Synthesis of Purines, Adenine and Guanine. **(ii)** Pyrimidines – Synthesis of Pyrimidine, Uracil, Thymine and Cytosine.	14
2	**(A) Nucleophilic Substitution at a Saturated Carbon Atom** Mechanism and scope of reaction-available mechanism, Kinetic Characteristics, Scope of reaction, Stereochemistry of S**N**1 and S**N**2 reactions, Relative reactivity in substitution, Solvent effect, variation at carbon site, Relative leaving group activity, S**N**i (substitution nucleophilic internal) Mechanism and Neighboring group participation. Elimination Reactions, E1, E2 and E1cB mechanism, Orientation E1and E2 reactions, Elimination Vs	14

	Substitution. **(B) Nucleophilic Aromatic Substitution** Nucleophilic aromatic substitution, Bimolecular displacement and its mechanism, Reactivity, Orientation, Electron withdrawal by resonance, Evidence for the two steps-mechanism, Elimination-addition mechanism-Benzyne.	
3	**(A) Inorganic reagents for Organic synthesis** Use of specific reagents and their synthetic applications with mechanism. (i) Aluminium Isopropoxide (ii) Lithium Aluminium Hydride (iii) Adams's catalyst (PtO2) (iv) Selenium Dioxide (v) Osmium Tetroxide (vi) Lead Tetraacetate **(B) Molecular rearrangements and Name Reactions** Rearrangements occurring through Carbocations, carbenes and nitrenes Principle, Mechanism and Synthetic applications of the reactions: (i) Wolf rearrangement (ii) Fries migration (iii) Hoffmann reaction (iv) Oppenauer oxidation reaction (v) Diels-Alder reaction (vi) Birch Reduction	14
4	**(A) Stereo Chemistry (I)** Optical activity in the absence of chiral carbon (Biphenyls, Allenes and Spirans) **(B) Stereoselectivity and Stereospecificity** Stereoselective and stereospecific reactions. Mechanism "Addition of halogens to alkenes". Stereochemistry of E2 reaction (syn and anti elimination).	14

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Books Recommended:

1. Organic Chemistry**:** I. L. Finar, Vol-II, 5th Edition, Pearson Education Ltd.
2. (2) Organic Chemistry**:** Morrison & Boyd, 6th Edition, Prentice Hall of India Pvt. Ltd.
3. (3) Stereochemistry of carbon compounds**:** E. L. Eliel, Wiley Eastern Ltd.
4. (4) Stereochemistry and mechanism through solved problems**:** P. S. Kalsi, New Age International.
5. (5) Stereochemistry of Organic Compounds: Principles and Applications**:** D. Nasipuri; New Academic Science; 4th Revised Edition.
6. (6) Organic Chemistry**:** Hendrickson, Cram, Hammond, Mc Graw-Hill.
7. (7) Organic Chemistry**:** 6th Edition, John Mcmurry, Brooks Cole, International Edition.
8. (8) Organic Chemistry**:** T.W. Graham Solomons and Craig B. Fryhle Wiley, 8th Edition.

9. (9) Organic Chemistry**:** Francis A. Carey, Mc Graw-Hill, 7th Edition.
10. (10) Organic Chemistry**:** Leroy G.Wade, Prentice Hall, 6th Edition.
11. (11) Organic Chemistry**:** Jonathan Clayden, Nick Greeves, Stuart Warren and Peter Wothers. Oxford University Press, USA.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

Chemistry-502
CODE : 53020502
B.Sc. 5th Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	50	50	-	150

Objectives:- To provide basic knowledge Chemistry

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Molecular symmetry** Introduction, symmetry operations and symmetry elements: Cn, σ, Sn, i and E. Point groups for the molecules (excluding S_{2n} and I_h). Multiplication tables of C_{2v}, C_{2h} and C_{3v} point groups.	14
2	**(A) Chemical bonding (I)** VB and MO treatment of H_2 and H_2^+, comparison of VB and MO MO treatment of $[FeF_6]^{-4}$, $[Fe(CN)_6]^{-4}$, $[V(CN)_6]^{-3}$, $[IrF_6]^{-4}$, $[NiF_4]^{-2}$, $[PtCl_4]^{-2}$ and $[Ni(CN)_4]^{-2}$. **(B) Boron hydrides** Preparation, properties and structure of diborane. Types of bonds found in higher boranes. Structure of B_4H_{10}, B_5H_9, B_5H_{11}, B_6H_{10} and $B_{10}H_{14}$.	14
3	**(A) Co-ordination chemistry** Reaction, kinetics and mechanism. Trans effect and trans influence, Applications of trans effect in synthesis and analysis. Theories of trans effect: Polarisation theory, π- bonding theory, MO theory. Lability, inertness, stability and instability.	14

	(B) Kinetics and reaction rates of substitution Ligand field effect and reaction rates, mechanism of substitution reaction. Nucleophilic substitution reaction (SN1 and SN2) in octahedral complexes. Substitution in square planar Pt (II)complexes. Substitution in octahedral Co (III) complexes. Acid hydrolysis, base hydrolysis. Cis effect. Electron transfer reaction. Mechanism of redox reaction (inner-sphere and outer-sphere).	
4	**(A) Inorganic polymers** Classification of inorganic polymers. Polymers containing boron and silicon**:** methods of preparation, physical and chemical properties, structures and their uses. **(B) Mossbauer Spectroscopy** Principle and Instrumentation. Experimental technique Application for iron complexes	14

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Books Recommended:

1. Concise Inorganic Chemistry**:** J.D. Lee; Wiley India, 5th Edition (1996).
2. 'Shriver and Atkins' Inorganic Chemistry**:** Atkins, Overton, Rourke, Weller, Armstrong;
3. Oxford University Press, 5th Edition (2011).
4. Advanced Inorganic Chemistry**:**. F.A. Cotton and Wilkinson G.; John Wiley, 5th Edition (1988).
5. Introductory Quantum Chemistry**:** A.K. Chandra; Tata- McGraw Hill, 4th Edition (1994).
6. Quantum chemistry**:** R.K. Prasad; New Age International, 4th Edition (2010).
7. Electron and chemical bonding**:** H. B. Grey, W.A.Benjamin. INC, New York.
8. Inorganic chemistry**:**. James E. Huheey, 4th Edition,Wesley Publishing Company.
9. Mechanism of Inorganic reaction**:** Basalo and Pearson, 2nd Edition, Wiley Eastern Pvt Ltd.
10. Introduction to Advanced Inorganic chemistry, Durrant and Durrant, John Wiley.
11. Advanced Inorganic chemistry**:** (Vol. 1) Satya Prakash, Tuli, Basu and Madan; S. Chand
12. Advanced Inorganic chemistry**:** Gurdeep Raj; Goel Publishing House, 23rd Edition (1998).

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

Chemistry-503
CODE : 53020503
B.Sc. 5th Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	50	50	-	150

Objectives:- To provide basic knowledge Chemistry

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Thermodynamics** Zeroth law of Thermodynamics, Clausius - Clapeyron equation, Trouton's Rule, Craft's equation, van't Hoff's isotherm and isochore equations.	14
2	**Electrochemistry** Electrochemical cell and Electrolytic cell, Reversible and irreversible electrodes and cell, Poggendorff's compensation method and Weston cell, Reference electrodes (i) Saturated Calomel Electrode (ii) Standard Hydrogen Electrode (iii) Quinhydrone Electrode, Nernst's single electrode potential equation, Applications of emf measurements to calculate ΔG, ΔG_o, ΔH, ΔS , K_{eq}, K_{sp}, K_w and K_h.	14
3	**(A) Chemical Kinetics** Prediction of reaction rate, Primary and secondary salt effect, Heterogeneous reactions, Retarded reaction. **(B) Polymer Chemistry** Polymerization and types of Polymerization, Co-polymers, Bio-	14

	polymers, Polymer additives, Thermodynamics of polymer solution, Molecular weight determination of polymers: Number average molecular weight, Weight average molecular weight, Viscosity and Osmotic pressure method.	
4	**(A) Nuclear Chemistry** Detection of isotopes, Velocity focusing mass spectrograph, Bainbridge and Neiers mass spectroscopy, Double focusing mass spectroscopy, Applications of isotopes and trace technique examples **(B) Molecular spectra** Pure rotational spectra, Equation for frequency of pure rotational spectral line, Vibrational-Rotational spectra, Equation for frequency of vibrational-rotational spectral line, Ortho and Para hydrogen.	14

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Books Recommended:

1. Physical Chemistry**:** G. M. Barrow, 5th Edition, McGraw-Hill education, India.
2. Advanced Physical Chemistry**:** Gurdeep Raj, 35th Edition (2009), Goel / Krshina Publishing House.
3. Principles of Physical Chemistry**:** Puri, Sharma and Pathania, 42nd Edition, Vishal Publishing Company.
4. Polymer Science**:** Gowariker, Viswanathan and Sreedhar, 1st Edition (2012 reprint) New Age International.
5. Essentials of Nuclear Chemistry**:** Arnikar, 4th Edition (2012 reprint), New Age International.
6. Physical Chemistry**:** Atkins, 9th Edition. Oxford University Press.
7. Advanced Physical chemistry**:** Gurtu and Gurtu, 11th Edition , Pragati Prakashan.
8. Physical chemistry**:** Levine, 6th Edition, McGraw-Hill education, India.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

Chemistry-504
CODE : 53020504
B.Sc. 5th Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	50	50	-	150

Objectives: - To provide basic knowledge Chemistry

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**(A) Ultraviolet Spectroscopy** Origin of UV Spectra, Principle, Electronic transition (σ-σ*, n-σ*, π-π* and n-π*), relative positions of λmax considering conjugative effect, steric effect, solvent effect, red shift (bathochromic shift), blue shift (hypsochromic shift), hyperchromic effect, hypochromic effect (typical examples). Aromatic and Polynuclear aromatic hydrocarbons. **(B) Ultraviolet Spectroscopy (Problems)** Problems of Dienes and enones using Woodward-Fieser rules. Problems of aromatic ketones, aldehydes and esters using empirical rules.	14
2	**(A) Infrared Spectroscopy** Introduction, principle of IR spectroscopy, instrumentation, sampling technique, selection rules, types of bonds, absorption of common functional groups. Factors affecting frequencies, applications. Application of Hooke's law, characteristic stretching frequencies of O-H, N-H, C-H, C-D, C=C, C=N, C=O functions; factors affecting stretching frequencies (H-bonding, mass effect, electronic factors, bond	14

	multiplicity, ring size). **(B) Raman Spectra** Basic principal, Instrumentation, Application of Raman spectra, Comparison of IR and Raman spectra.	
3	**(A) Nuclear Magnetic Resonance** Principal, Magnetic and non magnetic nuclei, absorption of radio frequency. Equivalent and non equivalent protons, chemical shifts, anisotropic effect, relative strength of signals, spin-spin coupling, long range coupling, coupling constant, Deuterium labelling, applications to simple structural problems. **(B) Problems based on Spectral data** Structural problems based on UV, IR and NMR	14
4	**(A) Visible Spectroscopy** Introduction, Beer Lambert's law, instrumentation (light source, optical system, wavelength selector, light sensitive device), Accuracy and error of Spectrophotometry. **(B) Atomic Spectroscopy** Introduction, Principle, Flame Emission Spectroscopy (FES) and Atomic adsorption Spectroscopy (AAS), Principal, comparison and applications, Burners (Total consumption burner and Premix burners), Inductively coupled plasma Emission Spectroscopy (ICPES)	14

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Books Recommended:

1. Introduction to Spectroscopy**:** Donald L. Pavia, Gary M. Lampman, George S. Kriz
2. Cengage Learning; 4th Edition.
3. Spectrometric Identification of Organic Compounds**:** Robert M. Silverstein, Francis X. Webster, David Kiemle Wiley; 7th Edition.
4. Infrared spectra of Complex molecules**:** J. Bellamy, John Wiley & Sons, Inc., 3rd Edition.
5. Spectroscopic Method in Organic Chemistry**:** Dudley Williams, Ian Fleming McGraw-Hill Education; 6th Edition.
6. Applications of spectroscopic techniques in Organic Chemistry**:** P.S. Kalsi, New Age International; 6th Edition.
7. Elementary Organic Spectroscopy; Principles And Chemical Applications**:** Y. R. Sharma, S. Chand & Co Pvt Ltd.
8. Fundamentals of Molecular Spectroscopy**:** C. M. Banwell and E. McCash, Tata McGraw Hill, 4th Edition.
9. Modern Raman Spectroscopy**:** A Practical Approach; Ewen Smith, Geoffrey Dent., Wiley, 1st Edition.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

SEMESTER-V

DEPARTMENT OF CHEMISTRY

CHEMISTRY PRACTICAL -505

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	50	50	-	150

Objectives:- To provide basic knowledge Chemistry

Practical [I] (Inorganic and Physical Practicals)

[A] Inorganic Qualitative Analysis:

Inorganic Qualitative Analysis of mixture containing six radicals only.
(Minimum 08 mixtures to be done)

[B] Physical Chemistry (Kinetics, Solubility & Instruments)

(1) Kinetics and solubility:

Investigate the order of reaction in experiments no. 1, 2 and 3 by graphical method.

Exp 1: Reaction between $K_2S_2O_8$ and KI (a □ b)

Exp 2: Reaction between $KBrO_3$ and KI (a = b)

Exp 3: Reaction between H_2O_2 and HI (a □ b)

Exp 4: Determine the heat of solution of a given substance (Oxalic acid and Benzoic acid) by solubility method.

(2) Instruments:

Exp 1: Determine dissociation constant of monobasic acid (CH_3COOH) using pH meter.

Exp 2: Determine the amount of bases in given mix ($NaOH+NH_4OH$) Conductometrically using standard solution of HCl

Exp3: Determine the amount of ferrous in the given solution of Ferrous Ammonium Sulphate potentiometerically using standard $KMnO_4$ solution.

Exp 4: Determine the concentration of Cu^{2+} and Fe^{3+} in the given solution by Colourimetry.

Reference Books

(1) Vogel's "Textbook of Quantitative Chemical Analysis"**:** Pearson Education Ltd. 6th Edition, 2008.
(2) Vogel's "Qualitative Inorganic Analysis"**:** Pearson Education Ltd. 7th Edition, 2009.
(3) Gurdeep Raj, "Advanced Practical Inorganic Chemistry"**:** Krishna Prakashan, Meerut, 21st Edition, 2009.
(4) J. B. Yadav, "Advanced Practical Physical Chemistry"**:** Krishna Prakashan, Meerut, 29th Edition, 2010.
(5) P. H. Parsania, "Experiments in Physical Chemistry"**:** Neminath Printers Rajkot 1st Edition 2004.
(6) A. M. James and F. E. Prichard, "Practical Physical Chemistry"**:** Longman Group Limited London 3rd Edition Reprinted 1979. Guj. Uni. Chemistry Syllabus – B.Sc. Sem-V

Practical [II] (Organic and Analytical Practicals)

[A] Organic Preparation:

(i) Nitration of Acetanilide

(ii) Acetanilide from Aniline (Green Preparation)

(iii) Benzilic Acid from Benzil (Green Preparation)

(iv) 1,5-Diphenyl-penta-1,4-diene-3-one from Benzaldehyde and Acetone(Green Preparation)

(v) Diels-Alder reaction between furan and maleic acid (Green Preparation)

[B] Analytical:

(B-1) Organic Estimation:

(i) Unknown Acid (e.g., Oxalic, Succinic, Citric, Tartaric, Benzoic, Phthalic and Cinnamic acid)

(ii) Ketone (Acetone)

(iii) Ester

(B-2) Chromatography [TLC]

Analysis of the following drugs by Thin Layer Chromatography.

(i) Aspirin (ii) Paracetamol (iii) Ibuprofen

Reference Books

(1) A. I. Vogel, "Elementary Practical Organic Chemistry Part-II, Qualitative Organic Analysis"**:** CBS Publishers & Distributers, New Delhi, 2nd Edition, 2004.

(2) A. I. Vogel, "Elementary Practical Organic Chemistry Part III Quantitative Organic Analysis"**:** CBS Publishers & Distributers, New Delhi, 2nd Edition, 2004.

(3) Hand book of Organic qualitative analysis by H. T. Clarke.

(4) Practical Organic Chemistry**:** F. G. Mann and B. C. Saunders. Low – priced Text Book. ELBS, Longman.

(5) V.K. Ahluwalia, Sunita Dhingra, "Comprehensive Practical Organic Chemistry –Qualitative Analysis"**:** University Press (India) Private Limited, Hyderabad, 1st Indian Edition, 2010.

(6) "Advanced Practical Organic Chemistry"**:** Stanley Thornes Publishers Ltd., J Leonard, B Lygo, G Procter, 1st Indian Edition, 2004.

(7) "Quantitative Analysis"**:** R. A. Day, A. L. Underwood, Prentice-Hall of India Pvt. Ltd., New Delhi, 6th Edition, 2004.

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY

MICROBIOLOGY -501

CODE: 53040501

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	--	50	50	150

Objectives:- To provide basic knowledge of Molecular Genetics of prokaryotes

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Fundamentals:** Nature of Genetic material, Gene structure and function, DNA replication: semi-conservative nature, molecular mechanism, Okazaki fragments	10
2	**Gene Expression and its regulation:** Transcription(Sigma factor, Promoter, Operator), Genetic code, Translation (Initiation, elongation, termination), Regulation of gene expression	10
3	**DNA Damages and Repair:** Spontaneous and induced mutations, Molecular basis of Mutation(Physical, Chemical, Biological Mutagenesis), Consequences of mutation, Repair mechanism (Direct, Indirect, SOS repair)	10

4	**Gene transfer among Bacteria:** Horizontal and vertical gene transfer, Transformation, Transduction, Conjugation (role of sex factor, transfer of genes during $F^+ \times F$, $Hfr \times f^-$), Bacterial plasmids and transposable elements (Insertion sequences and Tn elements).	**10**

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Molecular Genetics of prokaryotes

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Microbiology- Pelczar, Chan and krieg, 5th Ed.
- Elementary Microbiology- H.A. Modi

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY

MICROBIOLOGY-502

CODE: 53040502

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	--	50	50	150

Objectives: - To provide basic knowledge of Bacterial Metabolism

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Enzymes and Energy:** Enzyme kinetics, Metabolic regulation, significance of metabolic regulation,Energy: its generation and conservation, Modes of ATP generation.	10
2	**Chemoheterotrophic Metabolism:** Utilizable substrates, Catabolism of glucose, TCA Cycle, Catabolism of Fatty acids and Proteins.	10
3	**Chemoautotrophic and Phototrophic metabolism:** Physiological groups of chemolithotrophs, generation of ATP and reducing power in chemoautotrophs, **Phototrophic metabolism.**	10

4	**Biosynthesis:** Principles governing biosynthesis, assimilation of ammonia, nitrate, molecular nitrogen & sulfate. Biosynthesis of saturated and unsaturated fatty acids, Polymerization, Methods of studying of Biosynthesis	**10**

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Bacterial Metabolism

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Microbiology- Pelczar, Chan and krieg, 5th Ed.
- Elementary Microbiology- H.A. Modi
- Fundamental of Biochemistry- Dr.A.C.Deb

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY

MICROBIOLOGY 503

CODE: 53040503

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	50	50		150

Objectives:- To provide basic knowledge Enzymology

Prerequisites:-

Course outline:- Enzymology

Sr. No.	Course Contents	Number of Hours
1.	Enzymology- General characteristics and classification, Terminology: holoenzymes, coenzymes, Apo enzymes, cofactors, activators, inhibitors, units of enzyme activity, isoenzymes, turn over number, specific activity, first order and zero order reactions. Structure of active site of enzymes, specificity of enzyme action- Types and factors affecting enzyme activity. Brief introduction of allosteric enzymes	8
2.	Enzyme kinetics- Derivation of Michaelis and Menten equation and its modifications (Line	8

	Weaver & Burk plot, Eadie-Hofstee and Hannes & Woolf plots). Enzyme Inhibition – competitive, non competitive, uncompetitive, mixed & substrate inhibition.	
3.	Enzyme immobilization - types, methods, application, advantages & limitations. Introduction to reverse micelles.	**8**
4.	Sources and applications of enzymes- amylase, protease and lipase in industries (detergent, leather, food, dairy, Textile and medical). Industrial production of enzymes.	**8**

Learning Outcomes:

At the end of the course the student would have basic knowledge of Enzymology.

Teaching & learning Methodology:

- Use of audiovisual aids
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Enzymology –Palmer
- Textbook of biochemistry – Vasudevan Shreekumari
- Biochemistry - Lehninger

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY

MICROBIOLOGY -504

CODE : 53040504

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	--	50	50	150

Objectives:- To provide basic knowledge of Metabolism.

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Energy metabolism:** Introduction to metabolism, Methods of studying, intermediary metabolism ATP (Structure, generation, & role, Modes of ATP generation in bacteria,Oxidative phosphorylation - ETC - components and organization. Mechanism of Oxidative phosphorylation, ATP synthase Fermentation and substrate level phosphorylation Bacterial photophosphorylation	12
2	**Carbohydrate metabolism** **Degradation:** EMP, PP & ED pathway of glucose catabolism.	12

	Reaction and energies of TCA cycle and its importance. Amphibolic nature of TCA, Anapleuretic reaction and glyoxylate cycle. - Regulation of glycolysis and TCA cycle. **Biosynthesis:** Gluconeogenesis. CO2 fixation - Calvin Benson cycle.	
3	**Lipid metabolism :** **Fatty acid degradation**: Beta-oxidation of saturated fatty acid - palmitic acid and its energetics, Oxidation of mono unsaturated fatty acids - olic acid.,Oxidation of Polyunsaturated fatty acid - linoleic acid - α and ω oxidation of fatty acid **Biosynthesis of fatty acid:** Biosynthesis of saturated fatty acids, Biosynthesis of mono unsaturated fatty acids - aerobic and anaerobic pathway, Biosysnthesis of poly unsaturated fatty acids - archidonic acid.	**10**
4	**Biosynthesis of Amino acids**: Aspartate family and Aromatic family. **Biosynthesis of Peptidoglycan:** **Catabolism of Amino acids:**Transamination, oxidative deamination, - Urea cycle , Stickland reaction.	**10**

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Metabolism.

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Principles of Biochemistry - Lehninger ,Nelson and Cox ,4th edition

- Biochemistry - Zubay, G. L.
- Biochemistry - Stryer, L.
- General Microbiology - Stanier, R. Y.
- Principles of Microbiology - Ronald M. Atlas
- Biochemistry - Voett and Voett
- Microbiology - Prescott, L. M.
- Microbiology Vol. I & II - Powar & Daginawala
- Biochemistry - S. Satyanarayana

SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF PHYSICS

PHYSICS -501

Code: 53050501

B.Sc. Semester 5

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	50	50	50	-	150

Objectives: -

Physics students will:

- Develop a solid grasp of core concepts and applications of differential equation, 2nd order differential equation, classical mechanics and quantum mechanics. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

Prerequisites:-Engineering physics majors must have a basic understanding of fundamental physics and mathematics.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Differential equations:** Some partial differential equations in physics, the method of Separation of variables, separation of Helmboltz equation in Cartesian coordinates, in spherical polar and cylindrical Coordinates, Laplace's equation in various coordinates, Choice	12

	of coordinate system and separability of a partial differential equation, Parabolic coordinates system, Prolate Spheroidal coordinates system, various examples based on the separation of variables.	
2	**2nd order differential equations**: Ordinary and Singular points, Series solution around an ordinary point, Series solution around a regular singular point: the method of Frobenius, Getting a second solution, Alternative method of getting the second solution, System of linear first order differential equations, Non-linear differential equations, related examples.	12
3	**Classical Mechanics:** **Lagrangian Formulation:** Introduction, Constraints, holonomic and non-holonomic constraints, scleronomous and rheonomous constraints, generalized coordinates, D'alembert's principle, Lagrange's equations, a general expression for kinetic energy, Symmetries and the laws of conservation, Cyclic or ignorable coordinates (including illustrations), Velocity dependent potential of electromagnetic field, Rayleigh's dissipation function. **Motion of a rigid body:** Introduction, Euler's theorem, Angular momentum and kinetic energy, The inertia tensor, Euler's equations of motion, Torque free motion, Euler's Angles, Motion of a symmetric top, Nutational motion.	12
4	**Quantum Mechanics: Exactly soluble Eigenvalue problems:** Introduction, the simple harmonic oscillator, the Schrödinger equation and energy eigenvalues, the energy eigenfunctions, properties of stationary states, the abstract operator method, Coherent states, the angular momentum operators, the eigenvalue equation for L2, separation of variables, admissibility conditions on solutions, eigenvalues, the eigenfunctions, Spherical harmonics, Physical interpretation, Parity. Angular momentum in stationary states of systems with spherical symmetry	12

Learning Outcomes:- Graduates of the Physics major fulfill the following outcomes as part of their education in physics:

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

Teaching & Learning Methodology:-

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programme/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include group work, with groups representing diverse cultures
- Draw upon the experience and expertise of staff from other countries and/or visiting academics

Books Recommended:

- Mathematical Physics by P.K. Chattopadhyay, New Age International Publishers (2006)
- Mathematical Methods for Physicists by G. Arfken, Academic Press
- Introduction to Classical Mechanics by R. G. Takawale and P. S. Puranik, Tata McGraw-Hill Publishing Co. Ltd.
- Classical Mechanics by A. B. Bhatia, Narosa Publication
- A Text Book of Quantum Mechanics by P. M. Mathews and K. Venketeshan, Tata McGraw-Hill Publishing Co. Ltd.
- Quantum Mechanics : Theory and Applications by A. Ghatak and S. Lokanathan, Macmillan India Limited

E-Resources:

List of Open Source Software/learning website:

- The Flying Circus of Physics 2nd edition by Jearl Walker, Wiley India
- Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education

- http://www.howstuffworks.com/ -- Tech stuff
- How things works by Louis A Bloomfeild, Wiley Publications
- Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
- Latest journals like BBC Knowledge, How things work-everyday technology explained by National Geographics.
- http://www.sciencefairadventure.com/

SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF PHYSICS

PHYSICS -502

Code: 53050502

B.Sc. Semester 5

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	50	50	50	-	150

Objectives: -

Physics students will:

- Develop a solid grasp of core concepts and applications of molecular spectra, Raman spectra, quantum statistics and solid state physics. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

Prerequisites:-Engineering physics majors must have a basic understanding of fundamental physics and mathematics.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Types of Molecular Spectra and Molecular Energy States:** Separation of electronic and nuclear motion - The Born Oppenheimer approximation, types of molecular spectra. **Pure Rotational Spectra:** Salient features of Rotational spectra, Molecular requirement for rotation spectra, experimental arrangement, Molecule as a rigid rotator, explanation of	12

	rotational spectra (without the process of solving Schrodinger equation to get energy formula), the non-rigid rotator, Isotope effect on rotational spectrum, tunable laser and pulse laser - introduction **Vibrational - Rotational Spectra:** salient features of vibrational - Rotational spectra, Molecule as a harmonic oscillator, Molecule as anharmonic oscillator, Vibrational frequency and force constant for anharmonic oscillator, Fine structure of Infrared bands: Molecule as vibrating rotator, Diatomic molecule as symmetric top, Thermal distribution of vibrational and rotational levels.	
2	**Raman Spectra :** Nature of the Raman spectra, experimental arrangement for Raman spectra, Classical theory of Raman effect, Quantum theory of Raman effect, Raman spectra and Molecular structure, Infrared spectra versus Raman spectra, Laser as intense source. **Classification of Molecular Electronic States:** Molecular electronic states, Symmetry properties of electronic eigenfunctions (symmetry classification of electronic states) **Fluorescence and Phosphorescence:** Luminescence, Mechanism of fluroscent emission, Mechanism of phosphorescent emission, Fluorescence spectrum compared with Raman spectrum.	12
3	**Formulation of Quantum Statistics:** Density matrix, Liovilles theorem in Quantum Statistical Mechanics, Condition for Statistical equilibrium, Ensemble in Quantum Mechanics, Problems **Bose Einstein and Fermi Dirac Distributions:**Symmetry of wave functions, the Quantum Distribution functions, the Boltzmann limit of Boson and Fermions Gases, Evaluation of the Partition function, Partition function for Diatomic Molecules (a) translation partition function (b) rotational partition function (c) vibration partition function (d)electronic partition function Equation of state for an Ideal gas, The quantum mechanical Para magnetic susceptibility, problems	12
4	**Solid State Physics:** **Elastic constants and elastic waves:** Analysis of elastic strains, Dilation, stress components, Elastic compliance and stiffness constants, Elastic energy density, elastic stiffness constants of cubic crystals, Bulk modulus and compressibility. Elastic waves in cubic crystals, waves in the [100] direction, waves in the [110] direction. **Free electron Fermi gas:** Introduction, Energy levels in one dimension, Effect of temperature on the Fermi-Dirac distribution, Free electron gas in three dimensions and density of states, Heat capacity of the electron gas and experimental	12

	heat capacity of metals, Electrical conductivity and ohm's law, Experimental electrical resistivity of metals, Thermal conductivity of metals, ratio of thermal to electrical conductivity.	

Learning Outcomes:- Graduates of the Physics major fulfill the following outcomes as part of their education in physics:

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

Teaching & Learning Methodology:-

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programme/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include group work, with groups representing diverse cultures
- Draw upon the experience and expertise of staff from other countries and/or visiting academics

Books Recommended:

- Atomic and Molecular Spectra : Laser by Rajkumar, Kedar Nath & Ram Nath

- Fundamentals of Statistical Mechanics by B. B. Laud, New Age International Publishers
- Introduction to Solid State Physics by C. Kittel, (Eight Edition) John Wiley and Sons
- Elements of Solid State Physics by J. P. Srivastava, Prentie-Hall of India Private Limited, New Delhi

E-Resources:

List of Open Source Software/learning website:

- The Flying Circus of Physics 2nd edition by Jearl Walker, Wiley India
- Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education
- http://www.howstuffworks.com/ -- Tech stuff
- How things works by Louis A Bloomfeild, Wiley Publications
- Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
- Latest journals like BBC Knowledge, How things work-everyday technology explained by National Geographics.
- http://www.sciencefairadventure.com/

SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF PHYSICS

PHYSICS -503

Code: 53050503

B.Sc. Semester 5

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	50	50	50	-	150

Objectives: -

Physics students will:

- Develop a solid grasp of core concepts and applications of electromagnetic induction, Electromagnetic radiation, alpha, beta ray and gamma rays. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

Prerequisites:-Engineering physics majors must have a basic understanding of fundamental physics and mathematics.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Electromagnetic induction:** Hysterisis, Maxwell's equations, Decay of free charge, Potentials of electromagnetic fields, More about the Lorentz gauge condition, Field energy and Field momentum. **Electromagnetic waves:** Plane waves in non-conducting media, Polarizations, Energy flux in a plane wave, Radiation pressure	12

	and Momentum, Plane waves in conducting medium, Skin effect.	
2	**Electromagnetic Radiation:** Retarded Potential, Radiation from an oscillating dipole, Linear Antenna, Lienaed-Wiechert Potentials, Potentials for a charge in uniform motion – Lorentz formula, Fields of an accelerated charge, Radiation from an acceleration charged particle at low velocity, Radiation when the velocity and acceleration of the particles are collinear, Radiation from a charged particle moving in a circular orbit, Elective quadrupole radiation.	12
3	**Alpha and Beta Rays:** **Alpha Rays:** Range of alpha particles, Disintegration energy of the spontaneous alpha decay, Alpha decay paradox - barrier penetration. **Beta Rays:** Introduction, Continuous Beta ray spectrum - difficulties encountered to understand it, Pauli's Neutrino Hypothesis, Fermi's theory of Beta decay, the detection of neutrino, Parity non-conservation in Beta decay.	12
4	**Gamma Rays and The liquid drop model of the nucleus:** **Gamma Rays:** Introduction, Gamma-ray emission – selection rules, Internal conversion, Nuclear isomerism. **The liquid drop model of the nucleus:** Introduction, Binding energies of nuclei : plot of B/A against A., Weizsacher's semi empirical mass formula Mass parabolas: prediction of stability against Beta decay for members of an isobaric family, Stability limits against spontaneous fission, Barrier penetration - decay probabilities for spontaneous fission, Nucleon emission.	12

Learning Outcomes:- Graduates of the Physics major fulfill the following outcomes as part of their education in physics:

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

Teaching & Learning Methodology:-

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

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- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include group work, with groups representing diverse cultures
- Draw upon the experience and expertise of staff from other countries and/or visiting academics

Books Recommended:

- Electromagnetics by B. B. Laud, 2nd Editon, Wiley Eastern Ltd
- Nuclear Physics - An Introduction by S.B. Patel, New Age International
- Nuclear Physics by D. C. Tayal, Himalaya Publisher

E-Resources:

List of Open Source Software/learning website:

- The Flying Circus of Physics 2nd edition by Jearl Walker, Wiley India
- Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education
- http://www.howstuffworks.com/ -- Tech stuff
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- http://www.sciencefairadventure.com/


SWARNIM SCIENCE COLLEGE, SSIU, KALOL, GANDHINAGAR
SSIU
BHOYAN RATHOD
Kalol, Gandhinagar

SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF PHYSICS

PHYSICS -504

Code: 53050504

B.Sc. Semester 5

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	50	50	50	-	150

Objectives: -

Physics students will:

- Develop a solid grasp of core concepts and applications of differential equation, 2nd order differential equation, classical mechanics and quantum mechanics. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

Prerequisites:-Engineering physics majors must have a basic understanding of fundamental physics and mathematics.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**General amplifier characteristics:** Introduction, concept of amplification, amplifier notations, current gain, voltage gain, power gain, amplifier input resistance, amplifier output resistance, maximum power transfer, conversion efficiency, classes of amplifier operation,	12

	harmonic distortion, three point method of calculating harmonic distortion, five point method of calculating harmonic distortion, oscilloscope display of an amplifier dynamic transfer curve, measurement of harmonic distortion, other types of amplifier distortion, decibels, other equations for decibel computation, zero dB reference level, use of voltmeter as dB indicator, voltmeter range correction factor, impedance correction factor, frequency response curves, amplifier bandwidth, phase relationship in amplifier square wave testing.	
2	**Frequency response of a transistor amplifier:** Low frequency response of a transistor amplifier: Effect of an emitter by pass capacitor on low frequency response, effect of coupling capacitor on low frequency response, cascading of CE stages, mid frequency gains, low frequency response of cascaded stages amplifier, low frequency response to a square wave, transformer coupled transistor amplifier, low frequency response of TC amplifier, step response of a TC amplifier. **High frequency response of a transistor amplifier:** High frequency model for a CE amplifier, approximate CE high frequency model with a resistive load, CE short circuit current gain, high frequency current gain with a resistive load, high frequency response of cascaded CE stages, amplifier high frequency response to a square wave high frequency response of a transformer coupled amplifier.	12
3	**Circuit analysis, design and Flip-Flop:** Circuit analysis and design: Boolean laws and theorems, sum of products method, truth table to Karnaugh map, pairs, quads and octets, Karnaugh simplification, don't care conditions, product of sums method product of sums simplification, Exclusive OR gate. **FLIP- FLOP**: RS flip flop, clocked RS flip flop, D flip flop, Edged triggered D flip flop, JK flip flop, JK master slave flip flop	12
4	**Network Transformations**: Reduction of complicated network, conversion between T and π sections, bridge T network, the lattice network, superposition theorem, the reciprocity theorem, thevenin's theorem, Norton theorem, maximum power transfer theorem, compensation theorem. Resonance : Definition of Q, the figure of merit, series resonance, Bandwidth of the series resonant circuit, parallel resonance or antirsonance, current in antiresonant circuits, Bandwidth of antiresonant circuits.	12

Learning Outcomes:- Graduates of the Physics major fulfill the following outcomes as part of their education in physics:

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

Teaching & Learning Methodology:-

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

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- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include group work, with groups representing diverse cultures
- Draw upon the experience and expertise of staff from other countries and/or visiting academics

Books Recommended:

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- Mathematical Methods for Physicists by G. Arfken, Academic Press
- Introduction to Classical Mechanics by R. G. Takawale and P. S. Puranik, Tata McGraw-Hill Publishing Co. Ltd.
- Classical Mechanics by A. B. Bhatia, Narosa Publication
- A Text Book of Quantum Mechanics by P. M. Mathews and K. Venketeshan, Tata McGraw-Hill Publishing Co. Ltd.
- Quantum Mechanics : Theory and Applications by A. Ghatak and S. Lokanathan, Macmillan India Limited

E-Resources:

List of Open Source Software/learning website:

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- Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education
- http://www.howstuffworks.com/ -- Tech stuff
- How things works by Louis A Bloomfeild, Wiley Publications
- Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
- Latest journals like BBC Knowledge, How things work-everyday technology explained by National Geographics.
- http://www.sciencefairadventure.com/

SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF PHYSICS

Combined Practical List for all theory papers

B.Sc. Semester 5

Practical List:- Sem-5 (Practical's of Paper 501,502,503 & 504)

Sr. No.	Practical Name
1	Acceleration due to gravity by Kater's pendulum (fixed knife edges).
2	Characteristics of G.M. Tube.
3	Viscosity by Log decrement
4	Refractive index by total internal reflection using Gauss eye piece.
5	An optical method of determining dielectric constant, dipole moment and polarizability of a polar liquid using Hollow prism
6	Determination of capacity of Scherreing Bridge
7	I -V Characteristics of Solar Cell and to determine fill-factor, voltage-factor and efficiency
8	Determination of unknown frequency using Wein Bridge
9	Hartley Oscillator. Measurement of frequency by C.R.O. (Transistorized).
10	Frequency response of CE amplifier
11	A.C. Circuit analysis by C.R.O. Measurement of frequency and phase difference

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MATHEMATICS

MATHEMATICS-501
Subject Code: 53030501
B.Sc. Semester -5

Teaching & Evaluation Scheme

The objective of evaluation is not only to measure the performance of student,but also to motivate them for better performance .Student are evaluated on the basis of Mid term examination and end examination Conducted by university.

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
3	2	-	5	5	50	50	50	-	150

Objectives

- The aim of this subject is to present the important ideas in Linear equation using multiple method to student whose principal interest lie outside the field of mathematics.
- It is a subject which provide a vital arena where students can see the interaction of mathematics and machine computation.

Prerequisites

A Candidate for admission to the bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

Course outline:

This Course designed for undergraduate and graduate students working on scientific , engineering,statistics , and mathematics majors This course serves as an introduction to numerical methods used to applied mathematics problems,with applications across the

spectrum of discription.

Sr.	Course Contents	Teaching

No.		hours
1	**Unit: I** Sum and product of complex numbers with properties, moduli and conjugate, triangle inequality, polar coordinates, product and quotients in exponential form, roots of complex numbers, De Moivre's theorem and application, the exponential function, trigonometric functions, hyperbolic functions, convergence of sequence and series.	8
2	**Unit: II** Functions of complex variables, theorems on limits, continuity, derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient condition for differentiability, polar coordinates, analytic functions and harmonic functions. Mapping and Conformal mapping: Elementary functions, mapping by elementary functions , mobius mapping, linear function. Bilinear mapping w= (az+b)/(cz+d) ,w=z,$w=z^2$, $w=\frac{1}{z}$, $w=\exp(z)$	12
3	**Unit: III** Line integral(complex),Cauchy' integral formula,maximum modulus,(only statement),liouville's theorem.Definition of complex sequence, complex series and power series. Expansion of complex function in Taylor's series and Laurent's series.	14
4	**Unit: IV** Residues and poles: Definition of a singular point, Isolated singular points, Zeros of complex functions, Poles and residues of complex function, Cauchy's residue theorem, Evaluation of improper real integrals by residue theorem and evaluation of definite integral of trigonometric functions by residue theorem.	10

Learning Outcomes

After Successfully Completion of the Course the student will be ….

- Derive Numerical methods for various mathematical operation and tasks , such as interpolations,differentiations ,integration,the solution of linear and nonlinear equations, and the solution of linear and nonlinear equation, and the solution of differential equations.
- Analyse and evaluate the accuracy of common numerical methods.
- Derive numerical methods for various mathematical operations and tasks , such as interpolation,differentiations, integrations , the solution of Linear and nonlinear equations..

Teaching & Learning Methodology

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Books Recommended

1. S.S.Sastry, Introductory methods of Numerical analysis, Prentice hall of India, 1990.
2. Numerical Analysis by G. Shankar Rao.
3. Numerical Analysis, B.S.Grawal.
4. Numerical methods by Dr. P. kandasamy.
5. Introduction of Numerical analysis by Josef Stoer and Roland Bulirsch.
6. Analysis of Numerical Methods by Isaacson and Herbert Keller.

E-Resources

- SWAYAM PORTEL/ NPTEL- online courses on mathematical and quantum mechanics. https://swayam.gov.in/ and https://nptel.ac.in/
- cims.nyu.edu/~cfgranda/pages/OBDA_fall17/notes…
- www.sxccal.edu/mathematics-lecture-notes

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MATHEMATICS

Mathematics 502

Subject Code: 53030502

B.Sc. Semester -5

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
3	2	-	5	5	50	50	50	-	150

Objectives:-

- The aim of this subject is to present the important ideas in operation research using multiple method to student whose principal interest lie outside the field of mathematics.
- It is a subject which provides a vital arena where students can see the interaction of industrial mathematics and practical problems.

Prerequisites

- A Candidate for admission to the Bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

Course outline:

- This Course designed for undergraduate and graduate students working on scientific, engineering, statistics, and mathematics majors this course serves as an introduction to operation research used to applied mathematics problems, with applications across the spectrum of description.

Sr. No.	Course Contents	Teaching hours

1	**Unit: I** Convex Set and Linear Programming Problem Convex set, Extreme points of a convex set, Convex combination, Examples of convex sets and Theorems on Convexity. Formulation Techniques of LP problems (Only Examples).Problem solving techniques for LP problems :Simplex method for solving LPP, Big-M (Penalty) method, Two- Phase method, Integer programming problem (Only Gomory's cutting plane method).	10
2	**Unit: II** Duality and Dual simplex method Introduction, Definition of the dual problem, General rules for converting any primal problem into its dual, How to interpret the solution of the dual from its primal and vice versa, Comparison of the solution of the primal and its dual. Find initial solution for dual simplex table, Mathematical procedure to find solution by dual simplex method	8
3	**Unit: III** Introduction of Transportation problems and Assignment problems Mathematical formulation, Tabular representation, Definitions, Methods for finding initial basic feasible solution (North West Corner Rule, Least Cost Method, Vogel's Approximation Method), Optimality test (MODI method),Degeneracy in Transportation Problem, Unbalanced Transportation Problem. Introduction of Assignment problem, Mathematical formulation of Assignment problem, Method for solving Assignment problem (Hungarian Method), Unbalanced Assignment problem, Examples.	14
4	**Unit: IV** **Introduction to game**	10

Learning Outcomes:-

- In this Mathematics student will learns how to convert real life problems into linear equations.
- They will learn to solve set of linear equations.

- Students will learn the concept transportation and assignment problems NWC rules and MODI method.

Teaching & Learning Methodology:-

- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video Podcast etc) to support key concepts/knowledge.
- Particularly at the start of a program /module or for key areas, providing online
  or hard copy notes before classes can aid comprehension and accessibility.
- Include inquiry based learning exercises in international or intercultural contexts.
- Include group work, with groups representing diverse cultures and nationalities.

Reference Books:-

- Mathematical models in O.R. - J. K. Sharma, Tata-MacGraw Hills book-company.
- Operations Research – Nita H Shah, Ravi Gor and Hardik Soni. PHI –Learning.
- Optimization method in O.R. & System Analysis - K. V. Mittal, New Age inter. Publishers.
- Operation Research - S. D. Sharma, Kedarnath Ramnath & Co.
- Operation Research - Kanti Swaroop & Man Mohan, Sultan Chand & Co.
- Linear Programming - L. I. Gass, Tata McGraw Hills book-company.
- Linear Programming - G. Hadley, Narosa Publishing house.
- Operation Research- A. M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education.

E-learning websites for operation research:-

https://www.mathcity.org/msc/notes/operation_research

https://web.itu.edu.tr/topcuil/ya/OR.pdf

http://www.svecw.edu.in/Docs%5CCSEOSLNotes2013.pdf

https://www.mathcity.org/msc/notes/operation-research-haidar-ali

https://www.math.cuhk.edu.hk/course/1920/math3215

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MATHEMATICS

MATHEMATICS 503
Subject Code: 53030503
B.Sc. Semester -5

Teaching & Evaluation Scheme:-

The objective of evaluation is not only to measure the performance of student, but also to motivate them for better performance .Student are evaluated on the basis of Midterm examination and end examination Conducted by university.

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
3	2	-	5	5	50	50	50	-	150

Objectives:-

- The aim of the discrete mathematics is the study of mathematical structures that are fundamentally discrete rather than continuous.
- In contrast to real numbers that have the property of varying "smoothly", the objects studied in discrete mathematics – such as integers, graphs, and statements in logic do not vary smoothly in this way, but have distinct, separated values.
- Discrete mathematics therefore excludes topics in "continuous mathematics" such as calculus and analysis. Discrete objects can often be enumerated by integers.
- More formally, discrete mathematics has been characterized as the branch of mathematics dealing with countable sets (sets that have the same cardinality as subsets of the natural numbers, including rational numbers but not real numbers).

Prerequisites

A Candidate for admission to the Bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

Course outline:

This Course is designed to enable student to acquire the understanding and practice The application how to solve discrete mathematics.

Sr. No.	Course Contents	Teaching hours
1	**Unit-I:- Sets and functions** Sets, operations on sets , relations ,functions , binary operations , algebraic structures , operations on functions.	10
2	**Unit: II: - basics of graph theory** Definition of graph, simple graph ,degrees of vertices ,equivalence relation, random graph model ,digraph , paths , sub graphs , direct graph ,trail , walk , vertex sequence , circuit , cycle, multiple paths .	8
3	**Unit: III: - lattice theory** Introduction , product sets , relations , properties of relation , reflexive ,symmetric , antysymmetric , irreflexive, transitive ,equivalence relation ,partition , partially ordered set, hasse diagram ,minimal member , maximal member ,lattice as poset , properties of meet and join , lattice as an algebraic system , product of two lattices , order preserving , order isomorphism , lattice homomorphism , lattice isomorphism ,sub lattice , complete lattice , bounded lattice .	14
4	**Unit: IV:- Boolean algebra** Properties of Boolean algebra, Boolean algebra of switching circuits, sub-Boolean algebra, homomorphism and isomorphism of Boolean algebra Boolean ring, direct product of two Boolean algebras, join irreducible element, atom, and the stone representation theorem.	10

Learning Outcomes:-

- In this Math student will understand the Concept of discrete Mathematics.
- They will learn Boolean expression, lattice, basics of graph theory and mathematical induction.

Teaching & Learning Methodology:-

- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties. ⌄ Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge.
- Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include inquiry based learning exercises in international or intercultural contexts.
- Include group work, with groups representing diverse cultures and nationalities.

Reference Books:-

- Boolean Algebra and its Application – J. E. Whitesitt, Addison-Wesley Publishing Co. Inc. Foundation of Discrete Mathematics – K. D. Joshi, New Age International Limite Publishers, ISBN 81-224-0120-1.
- Logic and Boolean algebra – B. H. Arnold, P H Inc LCCN 62-19100.
- Introduction to Lattice Theory – D. E. Rutherford, University Mathematical Oliver and Boyed Ltd.
- Modern Applied Algebra - Garret Birkhoff and Thomas C Bartee, CBS Publishers and Distributors.
- Sets Lattices and Boolean Algebras - James C Abbott.
- Combinatorics including concepts of Graph Theory - V. K. Balakrishnan, Schaum's Outline Series, McGraw-Hill, INC.

E- Learning websites:-

- http://www.freebookcentre.net/maths-books-download/Lecture-Notes-for-College-Discrete-Mathematics.html
- https://edurev.in/studytube/Discrete-Mathematics-Class-Notes--Handwritten---En/1e99d2ca-6edf-4078-80a1-31d104ba010e_p
- http://math.bit.edu.cn/docs/20200928043347839160.pdf

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MATHEMATICS

MATHEMATICS-504
Subject Code: 53030504
B.Sc. Semester -5

Teaching & Evaluation Scheme

The objective of evaluation is not only to measure the performance of student, but also to motivate them for better performance .Student are evaluated on the basis of Midterm examination and end examination Conducted by university.

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
3	2	-	5	5	50	50	50	-	150

Objectives

Because of its generality, abstract algebra is used in many fields of science. OBJECTIVE OF THIS COURSE: This course is intended to provide a first approach to the subject of algebra by studying some basic algebraic structures, mapping between them and their substructures.

Prerequisites

A Candidate for admission to the Bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

Course outline:

This Course designed for undergraduate and graduate students working on scientific, engineering, statistics, and mathematics majors This course serves as an introduction to numerical methods used to applied mathematics problems, with applications across the spectrum of description.

Sr.	Course Contents	Teaching

No.		hours
1	**Unit I:-Binary operations & groups** Binary operations, division algorithm for integers, congruent modulo relation relation in Z, definition and examples of groups, elementary properties of group, equivalent definition of a group, finite groups and their tables, commutative and non commutative groups	10
2	**Unit II:- Subgroups and lattice diagrams** Subgroups, definition and examples, normalize and centralizers, order of an element , order of a group, cyclic group generated by an element, lattice diagrams of finite groups, cosets and its properties, Lagrange's theorem and its application, Euler's theorem, mFermat's theorem	12
3	**Unit III :- Permutations & normal subgroups** Permutations, definition and examples, cycle, transposition, even and odd permutation, order of a permutation, inverse of a permutation, symmetric groups and alternating groups, examples, quotient group, normal subgroup: definition and Examples.	12
4	**Unit IV :- Homomorphism & isomorphism of groups** Isomorphism of groups: definition and examples, isomorphism and equivalence relation, cyclic groups, properties OG cyclic groups, isomorphism of cyclic groups, Homomorphism of groups: definitions and examples, kernel of a homomorphism, fundamental theorem of Homomorphism, Calev's theorem, automorphism of groups	10

LEARNING OUTCOMES:-

- In this Math student will learns the concept of Group theory.
- Students will learn the concept of permutation.
- Students will learn Homomorphism & isomorphism of groups.
- Students will learn the fundamental theorem of homomorphism.

Teaching & Learning Methodology:-

- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge.
- Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include inquiry based learning exercises in international or intercultural contexts.
- Include group work, with groups representing diverse cultures and nationalities.

Reference Books:-

- I N Herstein, *Topics in Algebra,* Wiley Eastern Ltd.
- N. Jacobson, *Basic Algebra Vol I & II,* Hindustan Publishing company.
- Shanti Narayan, *A text book of Modern Algebra,* S.Chand & Co.
- P.B.Bhattacharya, S.K.Jain, S R Nagpal, *Basics Abstract Algebra, (second Edition) Cambridge University Press.*
- N.S. Gopalkrishna, *University Algebra,* Wiley Eastern, New Delhi Maclane Saunders and Birkhoff Garrett, *Algebra,* MacMillan, New York.
- G.F.Simmons, *Introduction to Topology and Modern Analysis,* MacGrawHill Inc., U.S.A.

E-LEARNING WEBSITES:-

http://www.universityofcalicut.info/SDE/Abstract_algebra.pdf

https://pkalika.in/2019/10/21/abstract-algebra-linear-algebra/

http://math.nevai.net/courses/mas4301/misc/syllabus.pdf


SWARNIM SCIENCE COLLEGE, SSIU, KALOL
SSIU
BHOYAN RATHOD
Kalol, Gandhinagar

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF SCIENCE

ENVIRONMENTAL SCIENCE

CODE: 53000503

SEMESTER 2

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	50	70	-	150

Objectives: - To provide a comprehensive knowledge for awareness of environment conservation and hazard management.

Prerequisites:- Environment Conservation & Hazard Management

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	Earth Science	6
2	Global Environmental Issues	10
3	Natural Resources and Management	6
4	Biomass Energy	8

Learning Outcomes:- At the closing stage of the course, the students will be able to understand the importance of environment conservation and the concepts of hazard management.

Teaching & Learning Methodology:- The Syllabus for Environmental Studies includes classroom teaching. The syllabus is divided into four units covering 30 lectures. The units are classroom teaching based to enhance knowledge skilled and attitude to environment.

Books Recommended:

1. R. R. Mahitcha – "Environment Conservation and Hazard Management", Atul Prakashan.
2. Solanki and Chetan Singh – "Renewable Energy Technologies", PHI Learning.
3. Izrael Y.A. – "Ecology and Control of the Natural Environment", Kluwer Academic Publisher.
4. Sharma, Sanjay K. – "Environment Engineering and Disaster Management", Laxmi Publications.
5. Earnest, Joshua and Wizelius, Tore – "Wind Power Plants and Project Development, PHI Learning.
6. Anandita Basak – "Environmental Studies", Pearson Publication.
7. K. S. Valadia – "Coping with Natural Hazards Indian Context", Orient Longman Publication.
8. Edward S. Rubin –"Engineering and Environment", McGraw Hill Publication

SYLLABUS

Unit-1

Ecology and Environment: Importance of environment and scope, Engineering and Environment issues, The natural system, Biotic and Biotic components and processes of natural system, Eco system, Food chain, webs and other biological Systems, Causes of environmental pollution, Pollution due to solid waste, Water pollution, Air pollution, The noise as pollution, Pollution of land due to industrial and chemical waste, Radiation and its effects on vegetables and animals

Unit-2

Solar power: Features of solar thermal and PV systems, Types of solar cookers and solar water heaters, Solar PV systems and its components and their working, Types of solar PV cells, Rating and Costing.

Unit-3

Seismic engineering and disaster management: Introduction of Seismic engineering and its application, Features of disasters such as floods, Earthquakes, Fires, Epidemics, Gas/radioactive leaks etc., Management and Mitigation of disasters.

Unit-4

Sustainable development: Concept of sustainable development, Natural resources, Abiotic and Biotic resources, Principles of conservation of energy and management, Need of renewable energy, Growth of renewable energy in India and the world, Concept of waste management and recycling.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY

BIOTECHNOLOGY -601

CODE : 53010601

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	30	20	70	30	150

Objectives:- To provide basic knowledge Enzymology

Prerequisites:-

Course outline:- Enzymology

Sr. No.	Course Contents	Number of Hours
1.	Enzymology- General characteristics and classification, definition of holoenzymes, coenzymes, apoenzymes, cofactors, activators, inhibitors, units of enzyme activity, isoenzymes, turn over number, specific activity, first order and zero order reactions. Structure of active site of enzymes, specificity of enzyme action- Types and factors affecting enzyme activity. Brief introduction of allosteric enzymes	12
2.	Enzyme kinetics- Derivation of Michaelis and Menten equation and its modifications (Line	10

	weaver & Burk plot, Eadie-Hofstee and Hannes & Woolf plots). Enzyme Inhibition – competitive, non competitive, uncompetitive, mixed & substrate inhibition.	
3.	Enzyme immobilization- types, methods, application, advantages & limitations. Introduction to reverse micelles.	**8**
4.	Sources and applications of enzymes- amylase, protease and lipase in industries (detergent, leather, food, dairy, Textile and medical). Industrial production of enzymes.	**8**

Learning Outcomes:

At the end of the course the student would have basic knowledge of Enzymology.

Teaching & learning Methodology:

- Use of audiovisual aids
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Enzymology –Palmer
- Textbook of biochemistry – Vasudevan Shreekumari
- Biochemistry - Lehninger

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY

BIOTECHNOLOGY -602

CODE : 53010602

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	30	20	70	30	150

Objectives:- To provide basic knowledge Industrial Microbiology

Prerequisites:-

Course outline:- Industrial Microbiology

Sr. No.	Course Contents	Number of Hours
1.	Fermentation (definition and applications), media (crude and synthetic), and sterilization of media. Screening- primary and secondary. Strain improvement	12
2.	Design of fermentor(aeration, agitation and body construction), Downstream processing- Filtration, centrifugation, cell disruption, precipitation & solvent extraction.	10
3.	Effect of aeration and agitation, methods of estimating C_{crit} and KL_a. Measurement of pH and temperature.	8
4.	Production of ethanol, cheese, beer, red & white	8

	wine, sparkling wine (champagne) Spoilage and preservation of food.	

Learning Outcomes:

At the end of the course the student would have basic knowledge of industrial microbiology

Teaching & learning Methodology:

- Use of audiovisual aids
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Industrial microbiology – Whitaker
- Industrial microbiology –AH Patel
- General microbiology - Frobisher

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY

BIOTECHNOLOGY -603

CODE : 53010603

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	30	20	70	30	150

Objectives:- To provide basic knowledge Molecular Biology

Prerequisites:-

Course outline:- Molecular Biology

Sr. No.	Course Contents	Number of Hours
1.	Replication in Eukaryotes-Problems associated with eukaryotic replication, Enzymes & Proteins involved in replication with its function, DNA damage and repair, mismatch repair, direct repair, excision repair, SOS repair &post-replicative repair.	8
2.	Transcription in Eukaryotes: Initiation, Elongation and Termination. Types of RNA polymerase, types of promoter, enhancers & silencers, Post Transcriptional modification-types of introns, splicing of RNA,t-RNA,r-RNA, modification of 5' and 3' ends.	10

3.	Translation in Eukaryote- Initiation, Elongation and Termination. Post-translational modification, protein targeting.	**10**
4.	Transposons: Types, mechanism and recombination, Applications of transposons in r-DNA technology.	**10**

Learning Outcomes:

At the end of the course the student would have basic knowledge of microbiology techniques and bacteria.

Teaching & learning Methodology:

- Use of audiovisual aids
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Genes – Benjamin Lewin
- Molecular Biology of the gene – Watson et al
- Molecular biology of the cell – Alberts et al

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY

BIOTECHNOLOGY -604

CODE : 53010604

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	30	20	70	30	150

Objectives:- To provide basic knowledge Cell Biology

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Fluid Mosaic model of membrane**: Functions of plasma membrane. Chemical composition of membrane-types & function of lipids, proteins and carbohydrate. Membrane fluidity.	10
2	**Cytoskeleton** –overview, types (microtubules, intermediate filaments and microfilaments) functions and significance .Molecular motors.	08
3	**Cell signaling** –basic characteristics of cell signaling & significance, second messenger, Role	08

	of G protein coupled receptors (GPCR) & receptor tyrosine kinases (RTK) in signaling pathway.	
4	**Apoptosis:** overview and significance. Regulation and control of apoptosis.caspases, activation of apoptotic pathways by internal and external stimuli. Cancer – introduction, types, mechanism, concept of proto-oncogenes and oncogenes.	**08**

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Cell Biology.

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Biochemistry-Lehninger
- Text book of biochemistry- Vasudevan & shreekumari

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

Chemistry-601
CODE : 53020601
B.Sc. 6th Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	50	50	-	150

Objectives:- To provide basic knowledge Chemistry

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**(A) Synthetic Dyes** Classification of Dyes- Anionic and Cationic dyes, Mordant and Vat dyes, Reactive and Dispersed dyes, Synthesis of Alizarin, Malachite green, Indigo, Congo red, Eosin. **(B) Explosives** Preparation of RDX, PETN, Nitroglycerine, Tetryl. **(C) Pesticides:** Preparation of Aldrine, Malathion, Parathion, Methoxychlor.	14
2	**(A) Synthetic Drugs** General Classification, Chemotherapy, Antipyretics, Analgesics, Hypnotics, Sedatives, Anaesthetics, Antimalerials, Antiseptics, Cardiovascular drugs. (Minimum two illustrations of each, only names without structures). Methods of preparation and uses of Antipyrine, Phenacetin, n-Hexyl resorcinol, Alprazolam, Zaleplon,	14

	Benzocaine, Lidocaine, Chloroquine, Atenolol, Sulphadiazine, Trimethoprim and Tolbutamide. **(B) Vitamins** Structure and Biochemistry of Vitamin-A (A1) (Retinol), Vitamin-B6 (Pyridoxine).	
3	**A) Alkaloids** Classification, General method of determining structure, analytical and synthetic methods, structure of Coniine, Nicotine, Atropine and Papaverine. **(B) Isoprenoids (Terpenoids)** Classification, General method of determining structure, Isoprene rule, Chemistry of Citral, α-Terpineol, Camphor and their synthesis, study of reactions of β-carotene (No Synthesis).	14
4	**(A) Stereo Chemistry** Concept of prostereo isomerism and chiral synthesis (Asymmetric Induction), Cram's rule, Prelog's generalization, Prelog's rule and assignment of configuration. **(B) Stereochemistry of compounds other then Carbon** Stereo chemistry of the compounds containing Nitrogen. Phosphorus and Sulphur	14

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Books Recommended:

(1) Organic Chemistry**:** I. L. Finar, Vol-II, 5th Edition, Pearson Education Ltd.
(2) Organic Chemistry**:** Morrison & Boyd, 6th Edition, Prentice Hall of India Pvt. Ltd.
(3) Stereochemistry of carbon compounds**:** E. L. Eliel, Wiley Eastern Ltd.
(4) Stereochemistry and mechanism through solved problems**:** P. S. Kalsi, New Age International.
(5) Stereochemistry of Organic Compounds: Principles and Applications**:** D. Nasipuri; New Academic Science; 4th Revised Edition.
(6) Organic Chemistry**:** Hendrickson, Cram, Hammond, Mc Graw-Hill.
(7) Organic Chemistry**:** 6th Edition, John Mcmurry, Brooks Cole, International Edition.
(8) Organic Chemistry**:** T.W. Graham Solomons and Craig B. Fryhle Wiley, 8th Edition.
(9) Organic Chemistry**:** Francis A. Carey, Mc Graw-Hill, 7th Edition.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

Chemistry-602
CODE : 53020602
B.Sc. 6th Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	50	50	-	150

Objectives:- To provide basic knowledge Chemistry

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Chemical bonding (II)** The Huckel Molecular Orbital (HMO) theory, variation principle, solution of Secular equation, HMO treatment to ethylene molecule, allylic cation, allylic free radical and allylic anion, Hybridization: Hybridization wave functions of sp, sp^2 and sp^3.	14
2	**(A) Term symbol** Russel Saunders coupling and determination of Term symbols of the ground state. Calculation of number of microstates. Pigeon hole diagram of p^2 and d^2 configurations. Hund's rule. Hole formulation. **(B) Electronic spectra of metal complexes** Electronic spectra of transition metal complexes, Laporte orbital and spin selection rules. Orgel energy level diagram of d^5 and combined diagrams of d^1 - d^9, d^2 – d^8, d^3 – d^7, d^4 – d^6 and their spectra. Jahn Teller distortion. Spectrochemical series.	14
3	**(A) Metal carbonyls** Mono and poly-nuclear metal carbonyls: $Ni(CO)_4$, $Fe(CO)_5$, $Cr(CO)_6$,	14

	$Fe_2(CO)_9$, $Fe_3(CO)_{12}$, $Co_2(CO)_8$, $Mn_2(CO)_{10}$, $Ir_4(CO)_{12}$, $Co_4(CO)_{12}$. Metal nitrosyl and metal carbonyl hydrides. Application of IR spectra in the determination of structure of metal carbonyls. **(B) Organometallic compounds** Definition, classification, synthesis (general methods), properties, structure and application of organometallic compounds of Mg, Al and Be, Structure of Ferrocene and dibenzene chromium.	
4	**Quantum chemistry** Setting up of operators for different observables, Hermitian operator, important theorems concerning Hermitian operator, Particle in a three dimensional box, The rigid Rotator, The Schrodinger equation in spherical polar coordinates for hydrogen atom, separation of variables, solution of R, Θ and Φ equations	14

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Books Recommended:

(1) Concise Inorganic Chemistry**:** J.D. Lee; Wiley India, 5th Edition (1996).

(2) 'Shriver and Atkins' Inorganic Chemistry**:** Atkins, Overton, Rourke, Weller, Armstrong;
(3) Oxford University Press, 5th Edition (2011).
(4) Advanced Inorganic Chemistry**:**. F.A. Cotton and Wilkinson G.; John Wiley, 5th Edition (1988).

(5) Introductory Quantum Chemistry**:** A.K. Chandra; Tata- McGraw Hill, 4th Edition (1994).

(6) Quantum chemistry**:** R.K. Prasad; New Age International, 4th Edition (2010).

(7) Electron and chemical bonding**:** H. B. Grey, W.A.Benjamin. INC, New York.

(8) Inorganic chemistry**:**. James E. Huheey, 4th Edition,Wesley Publishing Company.

(9) Mechanism of Inorganic reaction**:** Basalo and Pearson, 2nd Edition, Wiley Eastern Pvt Ltd.

(10) Advanced Inorganic chemistry**:** (Vol. 1) Satya Prakash, Tuli, Basu and Madan; S. Chand

(11) Advanced Inorganic chemistry**:** Gurdeep Raj; Goel Publishing House, 23rd Edition (1998).

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

Chemistry-603
CODE : 53020603
B.Sc. 6th Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	50	50	-	150

Objectives:- To provide basic knowledge Chemistry

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**Thermodynamics** Colligative properties: Boiling point elevation and freezing point depression. Molal elevation constant (Kb) and Molal depression constant (Kf), Calculation of absolute value of entropy using third law of thermodynamics, Law of mass action using chemical potential, Partial molar quantity.	14
2	**Electrochemistry** Concentration cell: Cell with and without transference, Electrode concentration cell, Gas electrode concentration cell, Activity and activity coefficient determination, Define liquid junction potential and how it can be avoided, Equation for liquid junction potential, Decomposition potential, Overvoltage, Tafel equation	14
3	**(A) Phase Rule** Binary system : Zn-Cd and Pb-Ag ,Zeotropic and azeotropic mixtures, Steam distillation, Zone refining.	14

	(B) Osmosis Desalination and reverse osmosis, Electrodialysis, Electrochemistry and pollution control, Removal of Cu, Ag and Fe from waste water.	
4	**(A) Photochemistry** Laws of Photochemistry : Grotthuss-Draper Law, Einstein Law, Quantum yield ,Reasons for high and low quantum yield, Fluorescence and Phosphorescence, Chemiluminescence, Photosensitized reactions. **(B) Metallic Corrosion** Types of corrosion, Electrochemical series, Corrosion in acidic and neutral medium, Differential aeration principle, Atmospheric corrosion, Prevention of corrosion by various factor.	14

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Books Recommended:

(1) Physical Chemistry**:** G. M. Barrow, 5th Edition, McGraw-Hill education, India.

(2) Advanced Physical Chemistry**:** Gurdeep Raj, 35th Edition (2009), Goel / Krshina Publishing House.

(3) Principles of Physical Chemistry**:** Puri, Sharma and Pathania, 42nd Edition, Vishal Publishing Company.

(4) Polymer Science**:** Gowariker, Viswanathan and Sreedhar, 1st Edition (2012 reprint) New Age International.

(5) Essentials of Nuclear Chemistry**:** Arnikar, 4th Edition (2012 reprint), New Age International.

(6) Physical Chemistry**:** Atkins, 9th Edition. Oxford University Press.

(7) Advanced Physical chemistry**:** Gurtu and Gurtu, 11th Edition , Pragati Prakashan.

(8) Physical chemistry**:** Levine, 6th Edition, McGraw-Hill education, India.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

Chemistry-604
CODE : 53020604
B.Sc. 6th Semester

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	50	50	-	150

Objectives:- To provide basic knowledge Chemistry

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	**(A) Errors and treatment of Analytical data:** Significant figures, Accuracy and precision, Types of errors and minimization of errors. Ways of expressing accuracy and precision. Rejection of a result, Test of significance (Q-Test, Student t-Test and F-Test) correlation coefficient. Literature of Analytical Chemistry. **(B) Organic reagents used in quantitative Analysis** Separation of methods with 8-Hydroxy Quinoline, Cupferron and DMG	14
2	**(A) Chromatographic methods:** General principle, classification of chromatographic separation. Ion exchange chromatography (Ion Exchange equlibria, Types of Ion Exchange capacity, Application of Ion Exchange resins). Gas Chromatography, Instrumentation and evolution of data. High Performance Liquid Chromatography (HPLC) Principle and Instrumentation.	14

	(B) Solvent Extraction Separation: Principles of solvent extraction, choice of solvent, distribution coefficient, distribution ratio, percentage (%) extraction. The extraction process, solvent extraction of metals, selective extraction and separation efficiency.	
3	**(A) Polarography:** Introduction, Principle, electrode, Types of currents, Determination of half wave potential, Ilkovic equation, methods of determining concentration (Standard addition method and Calibration method) **(B) Potentiometry:** The scope of potentiometric titrations, Precipitation and neutralization titrations, Graphical method including Gran's plot for selecting end point, Differential titration, Dead stop titration, Ion selective Electrode, various types of Ion selective Electrodes and use of Calcium ion selective electrode.	14
4	**Miscellaneous Titrations:** (**A**) **Acid Base Titrations:** Titration of poplyprotic acid and mixture of acids, titration of salts, Differential Alkali titration. (**B**) **Redox titration:** Titration involving Iodine: iodimetry and iodometry, Titration with reducing agents and oxidising agents, metallic reductors. (**C**) **Complexometric titration:** EDTA titration techniques-Direct, Back, Displacement and Indirect Tititration, Masking, Demasking agent, ligand effect and Hydrolysis of EDTA complex, Auxiliary complexing agent- EDTA titration with an auxiliary complexing agent.	14

Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Books Recommended:

(1) Analytical Chemistry**:** Gary D. Christian, 6th Edition; Wiley & Sons
(2) Fundamentals of Analytical Chemistry**:** D. A. Skoog, D. M. West and F. J. Holler, 9th Edition, Cengage Learning.
(3) Instrumental Methods of analysis**:** (CBS) H.H . Willard, L.L. Mirrit, J.A. Dean
(4) Solvent extraction in Analytical Chemistry**:** G.H. Morrison, F. Frieiser, John Wiley & Sons, NY.
(5) Instrumental Methods of Inorganic Analysis**:** A.I. Vogel, ELBS
(6) Chemical Instrumentation**:** A Systematic approach- H.A. Strobel
(7) The principals of ion-selective electrodes and membrane transport**:** W.E.Morf

(8) Principles of Instrumental Analysis**:** Douglas A. Skoog., F. James Holler, Stanley R. Crouch, Cengage Learning; 6th Edition.
(9) Quantitative Chemical Analysis**:** Daniel C. Harris, W H Freeman, New York.
(10) Ion exchange and solvent extraction of metal compounds**:** Y. Macros, A.S.Kertes, Wiley, Interscience.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

SEMESTER-VI

DEPARTMENT OF CHEMISTRY

CHEMISTRY PRACTICAL

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	30	20	70	30	150

Objectives:- To provide basic knowledge Chemistry

Practical [I] (Inorganic and Physical Practicals)

[A] Inorganic Quantitative Analysis:

(I) Gravimetric determination of the radicals:

(After removal of interfering radicals in mixed solution)
(a) $BaCl_2$, $FeCl_3$ and HCl (Determination of Ba as $BaSO_4$)
(b) $CuCl_2$, $MnCl_2$ and HCl (Determination of Mn as $Mn_2P_2O_7$)
(c) $CuSO_4$, $FeSO_4(NH_4)_2\ SO_4$ and H_2SO_4 (Determination of Fe as Fe_2O_3)
(d) $CuSO_4$, $Al_2\ (SO_4)_3$ and H_2SO_4 (Determination of Al as Al_2O_3)

(II) Analysis of Alloy:

(a) Brass (Cu → Volumetrically, Zn → Gravimetrically)
(b) German Silver (Cu → Volumetrically, Ni → Gravimetrically)

[B] Physical: (Kinetics and Instruments)

(1) Kinetics:

Investigate the order of reaction in the following experiments by graphical method .
Exp 1: Reaction between $K_2S_2O_8$ and KI (a =b)

Exp 2: Reaction between $KBrO_3$ and KI (a □ b)
Exp 3: Reaction between H_2O_2 and HI (a = b)

(2) Instruments:

Exp 1: Titration of unknown strength of HCl with standard NaOH solution using pH meter.
Exp 2: Conductometric titration involving precipitation of $BaCl_2$ with K_2CrO_4.
Exp 3 : To determine the concentration of CrO_4^{2-} and Ni^{2+} in solution by colourimetry.
Exp 4 : To determine specific rotation of glucose and hence to find out unknown concentration of glucose in given solution by optical (polarimeteric) measurements.

Reference Books

(1) Vogel's "Textbook of Quantitative Chemical Analysis"**:** Pearson Education Ltd. 6th Edition, 2008.
(2) Vogel's "Qualitative Inorganic Analysis"**:** Pearson Education Ltd. 7th Edition, 2009.
(3) Gurdeep Raj, "Advanced Practical Inorganic Chemistry"**:** Krishna Prakashan, Meerut, 21st Edition, 2009.
(4) J. B. Yadav, "Advanced Practical Physical Chemistry"**:** Krishna Prakashan, Meerut, 29th Edition, 2010.
(5) P. H. Parsania, "Experiments in Physical Chemistry"**:** Neminath Printers Rajkot 1st Edition 2004.
(6) A. M. James and F. E. Prichard, "Practical Physical Chemistry"**:** Longman Group Limited London 3rd Edition Reprinted 1979. Guj. Uni. Chemistry Syllabus – B.Sc. Sem-VI

Practical [II] (Organic and Analytical Practicals)

[A] Organic:

Organic separation and Identification:

Separation of Binary Mixtures and Identification (Minimum 8 Mixtures)
(i) Solid + Solid (4 Mixtures)
(ii) Solid + Liquid (2 Mixtures)
(iii) Liquid + Liquid (2 Mixtures)
One Mixture from each of the following should be given Acid-Base, Acid-Phenol, Acid-Neutral, Phenol-Base, Phenol-Neutral, Base-Neutral, and Neutral-Neutral. Water soluble compounds are included.
Identification of separated organic compound must be done by physical and chemical tests, sodium fusion test, M.P / B.P., derivatives and crystallization.

[B] Analytical:

Volumetric Analysis:

(1) Estimation of Fe^{3+} by EDTA (Back Titration)
(2) Estimation of Bi^{3+} by EDTA
(3) Estimation of Chloride by silver nitrate (Mohr's Method)
(4) Estimation of Zn^{2+} and Cd^{2+} in a mixture by EDTA
(5) Estimation of Ca^{2+} and Mg^{2+} in a mixture by EDTA
(6) Determination of percentage purity of H_2O_2 solution by Iodometry method.

Reference Books

(1) A. I. Vogel, "Elementary Practical Organic Chemistry Part-II, Qualitative Organic Analysis"**:** CBS Publishers & Distributers, New Delhi, 2nd Edition, 2004.
(2) A. I. Vogel, "Elementary Practical Organic Chemistry Part III Quantitative Organic Analysis"**:** CBS Publishers & Distributers, New Delhi, 2nd Edition, 2004.
(3) Hand book of Organic qualitative analysis by H. T. Clarke.

(4) Practical Organic Chemistry**:** F. G. Mann and B. C. Saunders. Low – priced Text Book. ELBS, Longman.
(5) V.K. Ahluwalia, Sunita Dhingra, "Comprehensive Practical Organic Chemistry –Qualitative Analysis"**:** University Press (India) Private Limited, Hyderabad, 1st Indian Edition, 2010.
(6) "Advanced Practical Organic Chemistry"**:** Stanley Thornes Publishers Ltd., J Leonard, B Lygo, G Procter, 1st Indian Edition, 2004.
(7) "Quantitative Analysis"**:** R. A. Day, A. L. Underwood, Prentice-Hall of India Pvt. Ltd., New Delhi, 6th Edition, 2004.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MATHEMATICS

MATHEMATICS-601
Subject Code: 53030601
B.Sc. Semester -6

Teaching & Evaluation Scheme

The objective of evaluation is not only to measure the performance of student,but also to motivate them for better performance .Student are evaluated on the basis of Mid term examination and end examination Conducted by university.

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
3	2	-	5	5	50	50	50	-	150

Objectives

- To provide students the Concept of Riemann integrationn,Infinite series and Taylor's series,different type of function .
- The aim of this subject is to present the important ideas in advanced calculus using multiple method to student whose principal interest lie outside the field of mathematics.
- It is a subject which provide a vital arena where students can see the interaction of mathematics and machine computation.

Prerequisites

A Candidate for admission to the bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

Course outline: This Course designed for undergraduate and graduate students working on Riemann integration and Infinite series.

Sr. No.	Course Contents	Teaching hours
1	**Unit I Riemann Integration** Definition of the integral, Properties of the integral Existence theory (monotone, continuous functions etc. (includes Riemann sums) Fundamental theoremIntegration by parts and change of variable ,Mean value theorems (Weierstrass's Form and Bonnet's Form) (First and Second)	14
2	**Unit: II Infinite series** Basic Theory (covers upto comparison test), Series with positive terms (Condensation Test, Pringsheim's Test) Absolute convergence (includes alternating series), ratio and root tests with lim sup And lim inf	12
3	Unit: III **Infinite Series –II** Rearrangement of series, Cauchy Product of Series, Merten's theorem Power Series Improper integrals of the first and second kind**.**	10
4	**Unit: IV Taylor Series** Taylor's Theorem with Lagrange and Cauchy form of remainders , Expansions of exponential, logarithmic and trigonometric functions Binomial series theorem Power series solutions of differential equations	10

Learning Outcomes

After Successfully Completion of the Course the student will be ….

- Student can learn to solve the Riemann Integrationl, Infinite series and Taylor Series.
- Appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.

- Describe fundamental properties of the real numbers that lead to the formal development of real analysis.
- Comprehend rigorous arguments developing the theory underpinning real analysis.
- Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration;
- Construct rigorous mathematical proofs of basic results in real analysis;

Teaching & Learning Methodology

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Books Recommended

1. E.Kreyszing , Advanced Engineering Mathematics , Fifth edition , New Age International (P) Ltd., New Delhi , 1997.
2. B.S.Grewal,Higher Engineering Mathematics.
3. Mathematical Analysis by S.C. Malik, Wiley, Eastern Ltd., New Delhi
4. Mathematical Analysis by T.M. Apostol, Narosa Publishing House, New Delhi
5. A course of mathematical Analysis by Shanti Narayan , S.Chand & Co., New Delhi

E-Resources :

- SWAYAM PORTEL/ NPTEL- online courses on mathematical and quantum mechanics. https://swayam.gov.in/ and https://nptel.ac.in/
- http://www.freebookcentre.net/maths-books-download/Real-Analysis-Lecture-Notes-by-Itay-Neeman.html
- http://www.freebookcentre.net/maths-books-download/Real-Analysis-Notes-by-Manonmaniam-Sundaranar-University.html
- http://www.freebookcentre.net/maths-books-download/Real-Analysis-Notes-by-Prof.-Sizwe-Mabizela.html

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MATHEMATICS

MATHEMATICS-602
Subject Code: 53030602
B.Sc. Semester -6

Teaching & Evaluation Scheme

The objective of evaluation is not only to measure the performance of student,but also to motivate them for better performance .Student are evaluated on the basis of Mid term examination and end examination Conducted by university.

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
3	2	-	5	5	50	50	50	-	150

Objectives

- To provide students the Concept of Ring,Subring and its properties ,Polynomial Ring and Field .
- The aim of this subject is to present the important ideas in advanced calculus using multiple method to student whose principal interest lie outside the field of mathematics.
- It is a subject which provide a vital arena where students can see the interaction of mathematics and machine computation.

Prerequisites

A Candidate for admission to the bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

Course outline: This Course designed for undergraduate and graduate students working on Ring and Field. This course serves as an introduction to Ring and Field to Pure mathematics .

Sr. No.	Course Contents	Teaching hours
1	**Unit I Rings** Definition and examples, commutative ring, division ring, unity and unit elements of a ring, Field, properties of a ring, Boolean ring, Finite rings. Integral Domain: Zero divisor, Definition and examples of Integral Domain (Finite and of infinite order), Characteristic of a ring	14
2	**Unit: II Subrings** Definition and examples, necessary and sufficient criterion for subring, Ideals: Definition and examples, necessary and sufficient criterion for ideal, principal ideal ring, quotient ring and its operation tables Homomorphism: Definition and some examples, Kernel of homomorphism, Isomorphism of rings, Fundamental theorem on homomorphism, homomorphism and characteristic	12
3	**Unit: III Polynomial ring** Introduction and definition of polynomial, degree of polynomial, operation between polynomials, Integral domain D[x], different types of polynomials, factorization of polynomials, Division algorithm for polynomials, irreducibility of polynomial over field, Remainder and factor theorem, solution of polynomial equation, zero of polynomial, c, rational zero of polynomial.	10
4	**Unit: IV Field** Field, Subfield, Extension field, The field of quotients and integral domain, Prime fields, Finite fields, Maximal ideals, Prime ideals and their characterization through quotient ring.	10

Learning Outcomes

After Successfully Completion of the Course the student will be ….

- Student can understand the concept of Ring , Subring , Polynomial Ring , Field,Factorization of a ring, Homeomorphismand Isomorphism of a ring they can apply different properties on them
- Student able to solve the real word problem by using Ring and Field.
- Students able to solve integrationa and differentiation of series..
- In Ring .
- Student will understand Field ,integration and differentiation of a series.
- Identify the degree, leading coefficient, and leading term of a polynomial expression

Teaching & Learning Methodology

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs.
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Books Recommended

6. Abstract Algebra by .Scott M Lalonde.

7. Contemoorary abstract algebra-Joseph A. Gallian(Fourth edition).

8. Abstract Algebra by John Perry.

9. Mathematical Analysis by T.M. Apostol, Narosa Publishing House, New Delhi

10. A course of mathematical Analysis by Shanti Narayan , S.Chand & Co., New Delhi

E-Resources :

- SWAYAM PORTEL/ NPTEL- online courses on mathematical and quantum mechanics. https://swayam.gov.in/ and https://nptel.ac.in/
- https://open.umn.edu/opentextbooks/textbooks/217
- https://ocw.mit.edu/courses/mathematics/18-703-modern-algebra-spring-2013/lecture-notes/
- https://www.freebookcentre.net/maths-books-download/Notes-on-Abstract-Algebra-by-John-Perry.html
- https://www.freebookcentre.net/maths-books-download/Notes-on-Abstract-Algebra-by-Scott-M.-LaLonde.html

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MATHEMATICS

MATHEMATICS-603
Subject Code: 53030603
B.Sc. Semester-6

Teaching & Evaluation Scheme

The objective of evaluation is not only to measure the performance of student,but also to motivate them for better performance .Student are evaluated on the basis of Mid term examination and end examination Conducted by university.

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
3	2	-	5	5	50	50	50	-	150

Objectives

- To provide students the Concept of Matric space,Continuity and connectedness and integration and differentiation of series .
- The aim of this subject is to present the important ideas in Analysis-III using multiple method to student whose principal interest lie outside the field of mathematics.
- It is a subject which provide a vital arena where students can see the interaction of mathematics and machine computation.

Prerequisites

A Candidate for admission to the bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

Course outline: This Course designed for undergraduate and graduate students working on Matric Spaces and integration and differentiation of series. This course serves as an introduction to Matric spaces used to Pure mathematics .

Sr. No.	Course Contents	Teaching hours
1	**Unit I** Metric Spaces Definition and Examples, Open Sets.Closed Sets, Convergence, Completeness and Baire's Theorem.	10
2	**Unit: II** Continuity, Compactness and Connectedness Compact sets, Connected sets, Continuous functions ,Continuity and compactness Continuity and connectedness	10
3	**Unit: III** Uniform Convergence, Pointwise Convergence Uniform Convergence, Uniform Convergence and Continuity, Uniform Convergence and Differentiation Term by Term Integration of Series, Term by Term Differentiation of Series	12
4	**Unit: IV** Power series (advanced), Abel's limit theorem, multiplication of power series(Expert sterling's formula),Taylor's series, Weierstrass approximation theorem, exponential, logarithmic and trigonometric functions	12

Learning Outcomes

After Successfully Completion of the Course the student will be ….

- Demonstrate understanding of the basic concepts, theorems and calculations of Normed, Metric Spaces.
- Demonstrate understanding of the open-set definition of continuity and its relation to previous notions of continuity, and applications to open or closed sets.
- Demonstrate understanding of the basic concepts, theorems and calculations of the concepts of Compactness, Connectedness and Completeness (CCC).

- Demonstrate understanding of the connections that arise between CCC, their relations under continuous maps, and simple applications.

Teaching & Learning Methodology

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Books Recommended

11. E.Kreyszing , Advanced Engineering Mathematics , Fifth edition , New Age International (P) Ltd., New Delhi , 1997.
12. B.S.Grewal,Higher Engineering Mathematics.
13. Mathematical Analysis by S.C. Malik, Wiley, Eastern Ltd., New Delhi
14. Mathematical Analysis by T.M. Apostol, Narosa Publishing House, New Delhi
15. A course of mathematical Analysis by Shanti Narayan , S.Chand & Co., New Delhi
16. W A Sutherland, Introduction to Metric and Topological Spaces, OUP.
17. E T Copson, Metric Spaces, CUP.
18. W Rudin, Principles of Mathematical Analysis, McGraw Hill.

E-Resources :

- SWAYAM PORTEL/ NPTEL- online courses on mathematical and quantum mechanics. https://swayam.gov.in/ and https://nptel.ac.in/
- https://www.mathcity.org/msc/notes/metric_spaces_notes
- https://msu.edu/~schenke6/Lecture_Notes/921_Lecture_Notes.pdf

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MATHEMATICS

MATHEMATICS-604
Subject Code: 53030604
B.Sc. Semester-6

Teaching & Evaluation Scheme

The objective of evaluation is not only to measure the performance of student,but also to motivate them for better performance .Student are evaluated on the basis of Mid term examination and end examination Conducted by university.

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
3	2	-	5	5	50	50	50	-	150

Objectives

- To provide students the Concept of vector Graph,Representation of a graph and Matrix Representation of a graph . .
- The aim of this subject is to present the important ideas in Graph Theory using multiple method to student whose principal interest lie outside the field of mathematics.
- It is a subject which provide a vital arena where students can see the interaction of mathematics and machine computation.

Prerequisites

A Candidate for admission to the bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

Course outline: This Course designed for undergraduate and graduate students working on Graph Theory . This course serves as an introduction to Graph and Matric representation of Graph used to applied mathematics problems. .

Sr. No.	Course Contents	Teaching hours
1	**Unit I Introduction of Graphs** Definition and elementary properties of graphs, Isomorphism of graphs, Sub graphs, Walks, Paths and circuits, Connected graphs, Euler graphs, Operations on graphs, Hamiltonian circuits, Definition and properties of tree.	10
2	**Unit: II Graph Representation** Centres in a tree, Rooted and Binary tree, Spanning trees, Fundamental circuits, cut set and its properties, Planar graphs and Representation of planar graphs.	12
3	**Unit: III Cut set ,connectivity and Seperability** Planar graphs and their different representation , Dual of a planar graph ,Euler's formula , Kuratowski's first and second non-planar graph, vector space associated with a graph , Circuit subspace and cut sets subspace Orthogonal space.	12
4	**Unit: IV Matrix Representation of a graph** Vertex coloring , Chromatic number ,Index number and partition , Cyclic graph and demyelization of cyclic graphs ,Matrix representation of a graph, Adjacency matrix, Incidence matrix, Path matrix circuit matrix ,fundamental circuit matrix and cut set matrix, relationship of these matrices ,rank of the adjacency matrix.	12

Learning Outcomes

After Successfully Completion of the Course the student will be ….

- Demonstrate knowledge of the syllabus material.
- Write precise and accurate mathematical definitions of objects in graph theory.
- Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples.

- Validate and critically assess a mathematical proof.
- Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of.
- Reason from definitions to construct mathematical proofs.
- Write about graph theory in a coherent.

Teaching & Learning Methodology

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Books Recommended

1. Graph theory with application to engineering and computer science by Narsingh Deo.1993, Prentice Hall ofIndia Pvt. Ltd.
2. Foundation of Discrete Mathematics, K.D. Doshi, New Age International Ltd. Publishers.
3. A first look at Graph theory, by Clark.
4. Discrete Mathematics Structures with application to computer science, by Trembly I.P & Manohar R.
5. Elements of Discrete Mathematics by L.Liu, Me Edition) by L.Liu, Me.
6. Discrete Mathematics, by Vasta, Vikas Publications.

7. Introduction Graph Theory, By R.J.Willson.

8. Discrete Mathematics Structure, By. Dugragi N.

E-Resources :

- SWAYAM PORTEL/ NPTEL- online courses on mathematical and quantum mechanics. https://swayam.gov.in/ and https://nptel.ac.in/
- https://cs.bme.hu/fcs/graphtheory.pdf
- https://www.geeksforgeeks.org/mathematics-graph-theory-basics-set-1/
- http://www.personal.psu.edu/cxg286/Math485.pdf

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY

MICROBIOLOGY -601

CODE:53040601

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	--	50	50	150

Objectives:- To provide basic knowledge Enzymology

Prerequisites:-

Course outline:- Enzymology

Sr. No.	Course Contents	Number of Hours
1.	Enzymology- General characteristics and classification, definition of holoenzymes, coenzymes, apoenzymes, cofactors, activators, inhibitors, units of enzyme activity, isoenzymes, turn over number, specific activity, first order and zero order reactions. Structure of active site of enzymes, specificity of enzyme action- Types and factors affecting enzyme activity. Brief introduction of allosteric enzymes	12
2.	Enzyme kinetics- Derivation of Michaelis and Menten equation and its modifications (Line	10

	weaver & Burk plot, Eadie-Hofstee and Hannes & Woolf plots). Enzyme Inhibition – competitive, non competitive, uncompetitive, mixed & substrate inhibition.	
3.	Enzyme immobilization- types, methods, application, advantages & limitations. Introduction to reverse micelles.	**8**
4.	Sources and applications of enzymes- amylase, protease and lipase in industries (detergent, leather, food, dairy, Textile and medical). Industrial production of enzymes.	**8**

Learning Outcomes:

At the end of the course the student would have basic knowledge of Enzymology.

Teaching & learning Methodology:

- Use of audiovisual aids
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Enzymology –Palmer
- Textbook of biochemistry – Vasudevan Shreekumari
- Biochemistry - Lehninger

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY

MICROBIOLOGY -602

CODE : 53040602

B.Sc. 3rd Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	--	50	50	150

Objectives:- To provide basic knowledge Industrial Biotechnology

Prerequisites:-

Course outline:- Industrial Biotechnology

Sr. No.	Course Contents	Number of Hours
1.	Fermentation (definition and applications), media (crude and synthetic), and sterilization of media. Screening- primary and secondary. Strain improvement	12
2.	Design of fermentor(aeration, agitation and body construction), Downstream processing- Filtration, centrifugation, cell disruption, precipitation & solvent extraction.	10
3.	Effect of aeration and agitation, methods of estimating C_{crit} and KL_a. Measurement of pH and temperature.	8
4.	Production of ethanol, cheese, beer, red & white	8

	wine, sparkling wine (champagne) Spoilage and preservation of food.	

Learning Outcomes:

At the end of the course the student would have basic knowledge of industrial microbiology

Teaching & learning Methodology:

- Use of audiovisual aids
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Industrial microbiology – Whitaker
- Industrial microbiology –AH Patel
- General microbiology - Frobisher

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY

MICROBIOLOGY -603

CODE : 53040603

B.Sc. 3rdYear

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	--	50	50	150

Objectives:- To provide basic knowledge of Metabolism.

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1.	Non Specific Host Defense Mechanisms: Phagocytosis, Complement, Inflammation, Cytokines Acute Phase Proteins, Cells, Tissues & Organs of the Immune System.	8
2.	**Specific Immune Responses: I** Antigens, Haptens, Cluster of Differentiation Molecules, Humoral & Cell Mediated Immunity. Recognition of Foreignness. T Cell Biology - T Cell receptors, Types of T	8

	Cells, T Cell Activation. B Cell Biology- B Cell Receptors, B cell Activation.	
3.	**Specific Immune Responses: II** Antibodies - (Immunoglobulins - Definition, Structure & Function, Classes of Immunoglobulins. Antigen-Antibody Reactions: General Features, Measurement of Antigen & Antibody. Serological Reactions: Precipitation Reactions, Definition, Mechanism - Zone Phenomenon & Lattice Hypothesis. Applications- Precipitation in Liquid Medium. Agglutination reactions- Definition, Applications- Slide agglutination test. Tube agglutination test, Passive agglutination test. Primary & Secondary Antibody response. Diversity of Antibodies, Clonal Selection Theory Monoclonal Antibody Technology.	**10**
4.	**Immune Disorders:** Immuno Deficiency. Hypersensitivity Autoimmunity - Mechanism & Classification of Autoimmune diseases. Immunology of Transplantation: Classification of Transplants. Allograft reaction (mechanism) Factors favouring Allograft survival. Graft v/s Host reaction. Immunology of Malignancy.	**8**

Learning Outcomes:

At the end of the course the student would have basic knowledge of microbiology techniques and bacteria.

Teaching & learning Methodology:

- Use of audiovisual aids
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Text book of Microbiology –Ananthnarayan & Panikar
- Microbiology – Presscott, Harley & klein

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY

MICROBIOLOGY -604

CODE : 53040604

B.Sc. 3st Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	2	5	5	50	--	50	50	150

Objectives:- To provide basic knowledge of Metabolism.

Prerequisites:-

Course outline:-

Sr. No.	Course Contents	Number of Hours
1.	Symbiotic & asymbiotic nitrogen fixation. Nitrogen fixation - Structure & mechanism of nitrogenase. Biofertilizers- Definition, Azotobacter & Rhizobia (With Production) Microbial insecticides.	8
2.	Bioleaching & bioleaching of Copper. Biodeterioration of wood, paint & metal. Bioremediation-introduction. Bioremediation of petroleum hydrocarbon & chlorinated compounds.	8

	Microbial enhanced oil recovery..	
3.	Concept of xenobiotics & recalcitrance. Biomagnification. Biodegradation of environmental pollutants. (ABS, Chlorinated hydrocarbons, Oil pollutants.) Biodegradable polymers.	**8**
4.	Introduction to biofuels. Renewable & nonrenewable energy resources. Features of biofuels. Biogas - substrate, microorganisms & production. Advantages & disadvantages of Biogas production.	**8**

Learning Outcomes:

At the end of the course the student would have basic knowledge of microbiology techniques and bacteria.

Teaching & learning Methodology:

- Use of audiovisual aids
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

Basic Text & Reference Books:

- Principles of Microbiology – RM Atlas
- Microbiology – Prescott LM
- Biotechnology- BD Singh

SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF PHYSICS

PHYSICS -601

Code: 53050601

B.Sc. Semester 6

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	50	50	50	-	150

Objectives: -

Physics students will:

- Develop a solid grasp of core concepts and applications of differential equation, 2nd order differential equation, classical mechanics and quantum mechanics. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

Prerequisites:-Engineering physics majors must have a basic understanding of fundamental physics and mathematics.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	Some special functions in Physics: Bessel functions, Bessel functions of the second kind, Henkel functions, Spherical Bessel functions, Legendre polynomials, Associated Legendre polynomials and spherical harmonics, Hermite polynomials, Laguerre polynomials, The gamma function, the Dirac delta	12

	function, examples.	
2	Variational principle : Lagrange's and Hamiltons equations : Introduction, Configuration space, Some techniques of calculus of variation, the delta-notation, Applications of the variational principle, Hamilton's principle, Equivalence of Lagrange's and Newton's equations, Advantages of the Lagrangian formulation -Electromechanical analogies, Lagrange's undetermined multipliers, Lagrange's equation for non-holonomic systems, Applications of the Lagrangian method of undetermined multipliers, Hamilton's equations of motion, some applications of the Hamiltonian formulation, Phase space, Comments on the Hamiltonian formulation.	12
3	Three dimensional square well potential: Solutions in interior region, Solutions in the exterior Region and Matching, Solution of the radial Equation: energy levels, Stationary state wave functions, Discussion of bound states, Solution of confluent hypergeometric functions, non localized states, solution in parabolic coordinates, the anisotropic oscillator, the isotropic oscillator, normal modes of coupled systems of particles, a charged particle in a uniform magnetic field	12
4	Representations, Transformations and Symmetries: Quantum states, state vectors and wave function, The Hilbert space of state vectors, Dirac notation, Dynamical variables and linear operators, Representations, Continuous basis - The Schrödinger representation, Degeneracy, Labeling by commuting observable, change of basis, Unitary transformations, Unitary transformation induced by change of coordinate system: translation, Unitary transformation induced by Rotation of coordinate system, The algebra of Rotation generators, transformation of dynamical variables, Symmetries and conservation laws, the space inversion, time reversal.	12

Learning Outcomes:- Graduates of the Physics major fulfill the following outcomes as part of their education in physics:

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

Teaching & Learning Methodology:-

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programme/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include group work, with groups representing diverse cultures
- Draw upon the experience and expertise of staff from other countries and/or visiting academics

Books Recommended:

- Mathematical Physics by P.K. Chattopadhyay, New Age International Publishers (2006)
- Mathematical Methods for Physicists by G. Arfken, Academic Press
- Introduction to Classical Mechanics by R. G. Takawale and P. S. Puranik, Tata McGraw-Hill Publishing Co. Ltd.
- Classical Mechanics by A. B. Bhatia, Narosa Publication
- A Text Book of Quantum Mechanics by P. M. Mathews and K. Venketeshan, Tata McGraw-Hill Publishing Co. Ltd.
- Quantum Mechanics : Theory and Applications by A. Ghatak and S. Lokanathan, Macmillan India Limited

E-Resources:

List of Open Source Software/learning website:

- The Flying Circus of Physics 2nd edition by Jearl Walker, Wiley India
- Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education
- http://www.howstuffworks.com/ -- Tech stuff
- How things works by Louis A Bloomfeild, Wiley Publications

- Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
- Latest journals like BBC Knowledge, How things work-everyday technology explained by National Geographics.
- http://www.sciencefairadventure.com/

SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF PHYSICS

PHYSICS -602

Code: 53050602

B.Sc. Semester 6

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	50	50	50	-	150

Objectives: -

Physics students will:

- Develop a solid grasp of core concepts and applications of differential equation, 2nd order differential equation, classical mechanics and quantum mechanics. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

Prerequisites:-Engineering physics majors must have a basic understanding of fundamental physics and mathematics.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	Electronic Spectra: Electronic Spectra, salient features, formation of electronic spectra, Vibrational (Gross) structure of electronic band system in emission, electronic band spectra in absorption, Rotational structure of electronic bands; Rotational structure of three branch bands; observed intensity	12

	distribution (vibrational) in band systems : Franck-Condon principle; explanation of intensity distribution in absorption bands from Franck-Condon principle. Explanation of intensity distribution in emission bands : Condon parabola. Line intensities in a band: Rotational intensity distribution. Quantum mechanical Exploting Franck-Condon principle.	
2	Transport Phenomena: Introduction, Mean collision time, Scattering cross-section, viscosity, electrical conductivity, thermal conductivity, thermionic emission, photoelectric effect, molecular collision, effusion, diffusion, Brownian motion, Einstein's relation for mobility	12
3	Theory of Dielectrics: Polarization, Dielectric constant, Local Electric field, Dielectric polarizability, Sources of polarizability, theory of electric polarizability and optical absorption, ionic polarization, polarization from dipole orientation, dielectric losses, Applications to optical phonon modes in ionic crystals, the longitudinal optical mode, the transverse optical mode, the interaction of electromagnetic waves with optical modes, application to the motion of electrons in polar crystals.	12
4	Diamagnetism and paramagnetism: Langevin's theory of diamagnetism, Langevin's theory of paramagnetism, theory of atomic magnetic moment, Hund's Rule, Quantum theory of magnetic susceptibility: A quantum mechanical formulation, Dimagnetism, Paramegnetism, application to magnetic ions in solids: effect of the crystal field, van Vleck paramagnetism, Pauli paramagnetism, Nuclear paramagnetism, Cooling by adiabetic demagnetization, magnetic resonance, ESR, NMR, Spin relaxation, line width and line shape	12

Learning Outcomes:- Graduates of the Physics major fulfill the following outcomes as part of their education in physics:

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

Teaching & Learning Methodology:-

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programme/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include group work, with groups representing diverse cultures
- Draw upon the experience and expertise of staff from other countries and/or visiting academics

Books Recommended:

- Mathematical Physics by P.K. Chattopadhyay, New Age International Publishers (2006)
- Mathematical Methods for Physicists by G. Arfken, Academic Press
- Introduction to Classical Mechanics by R. G. Takawale and P. S. Puranik, Tata McGraw-Hill Publishing Co. Ltd.
- Classical Mechanics by A. B. Bhatia, Narosa Publication
- A Text Book of Quantum Mechanics by P. M. Mathews and K. Venketeshan, Tata McGraw-Hill Publishing Co. Ltd.
- Quantum Mechanics : Theory and Applications by A. Ghatak and S. Lokanathan, Macmillan India Limited

E-Resources:

List of Open Source Software/learning website:

- The Flying Circus of Physics 2nd edition by Jearl Walker, Wiley India
- Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education
- http://www.howstuffworks.com/ -- Tech stuff
- How things works by Louis A Bloomfeild, Wiley Publications

- Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
- Latest journals like BBC Knowledge, How things work-everyday technology explained by National Geographics.
- http://www.sciencefairadventure.com/

SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF PHYSICS

PHYSICS -603

Code: 53050603

B.Sc. Semester 6

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	50	50	50	-	150

Objectives: -

Physics students will:

- Develop a solid grasp of core concepts and applications of differential equation, 2nd order differential equation, classical mechanics and quantum mechanics. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

Prerequisites:-Engineering physics majors must have a basic understanding of fundamental physics and mathematics.

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	Motion of charged particles in Magnetic & Electric field: Microscopic & Macroscopic description, Maxwell's equation & charge conservation, Motion of a charged particle in electric & Magnetic fields, Uniform magnetic field & Oscillating electric field, Drift velocity in a gravitational field, Magnetic field	12

	varying in space & time : adiabatic variance of the magnetic moment, Inhomogeneous magnetic field : gradient drift & curvature drift, peculiarity of drift motions, Converging magnetic field : magnetic mirror, Longitudinal adiabatic invariant, Periodic magnetic field : Gyro relaxation effect, Motion of magnetic lines of force.	
2	Characteristics of plasma in magnetic field: Description of plasma as gas mixture, Properties of plasma in a magnetic field, Force on plasma in magnetic field, Current in magnetized plasma, Diffusion in a magnetic field, Collisions in fully ionized magnetoplasma, Pinch effect, Oscillations and waves in the Plasma. Application of Boltzmann-Vlasov equation on plasma: Boltzmann equation, Fokker-Planck equation, Debye screening, Equilibrium distribution function and Boltzmann's H-theorem, Application of B-V equation to longitudinal waves: Dispersion relations., Initial value problem: Landau damping, Cyclotron damping, Excitation, two-stream instability: Beam plasma instability, Pinch instability, Plasma sheath, Non-linear effects	12
3	Nuclear Energy : Introduction, Neutron induced fission, Asymmetrical fission - mass yield, Emission of delayed neutrons by fission fragments, Energy released in the fission of U235, Fission of lighter nuclei, Fission chain reaction, neutron cycle in a thermal nuclear reactor, Nuclear reactors. Nuclear Physics in other areas of Physics: The Mossbaur effect, some experiments using Mossbaur effect, Natural Fusion - energy production in stars, Possibility of controlled fusion.	12
4	Elementary particles: The four basic forces, Particles and antiparticles, Families of particles, conservation laws, particle interactions and decays, energetics of particle reactions, the quark model, the standard model, Numerical Examples.	12

Learning Outcomes:- Graduates of the Physics major fulfill the following outcomes as part of their education in physics:

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

Teaching & Learning Methodology:-

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

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- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include group work, with groups representing diverse cultures
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- Introduction to Classical Mechanics by R. G. Takawale and P. S. Puranik, Tata McGraw-Hill Publishing Co. Ltd.
- Classical Mechanics by A. B. Bhatia, Narosa Publication
- A Text Book of Quantum Mechanics by P. M. Mathews and K. Venketeshan, Tata McGraw-Hill Publishing Co. Ltd.
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- Latest journals like BBC Knowledge, How things work-everyday technology explained by National Geographics.
- http://www.sciencefairadventure.com/

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF SCIENCE

ENVIRONMENT CONSERVATION & HAZARD MANAGEMENT

CODE: 53000603

1st Year

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
3	-	-	3	3	30	50	70	-	150

Objectives: - To provide a comprehensive knowledge for awareness of environment conservation and hazard management.

Prerequisites:- Environment Conservation & Hazard Management

Course outline:-

Sr. No.	Course Contents	Number of Hours
1	Ecology and Environment	6
2	Solar power	10
3	Seismic engineering and disaster management	6
4	Sustainable development	8

Learning Outcomes:- At the closing stage of the course, the students will be able to understand the importance of environment conservation and the concepts of hazard management.

Teaching & Learning Methodology:- The Syllabus for Environmental Studies includes classroom teaching. The syllabus is divided into four units covering 30 lectures. The units are classroom teaching based to enhance knowledge skilled and attitude to environment.

Books Recommended:

1. R. R. Mahitcha – "Environment Conservation and Hazard Management", Atul Prakashan.
2. Solanki and Chetan Singh – "Renewable Energy Technologies", PHI Learning.
3. Izrael Y.A. – "Ecology and Control of the Natural Environment", Kluwer Academic Publisher.
4. Sharma, Sanjay K. – "Environment Engineering and Disaster Management", Laxmi Publications.
5. Earnest, Joshua and Wizelius, Tore – "Wind Power Plants and Project Development, PHI Learning.
6. Anandita Basak – "Environmental Studies", Pearson Publication.
7. K. S. Valadia – "Coping with Natural Hazards Indian Context", Orient Longman Publication.
8. Edward S. Rubin –"Engineering and Environment", McGraw Hill Publication

SYLLABUS

Unit-1

Ecology and Environment: Importance of environment and scope, Engineering and Environment issues, The natural system, Biotic and Biotic components and processes of natural system, Eco system, Food chain, webs and other biological Systems, Causes of environmental pollution, Pollution due to solid waste, Water pollution, Air pollution, The noise as pollution, Pollution of land due to industrial and chemical waste, Radiation and its effects on vegetables and animals

Unit-2

Solar power: Features of solar thermal and PV systems, Types of solar cookers and solar water heaters, Solar PV systems and its components and their working, Types of solar PV cells, Rating and Costing.

Unit-3

Seismic engineering and disaster management: Introduction of Seismic engineering and its application, Features of disasters such as floods, Earthquakes, Fires, Epidemics, Gas/radioactive leaks etc., Management and Mitigation of disasters.

Unit-4

Sustainable development: Concept of sustainable development, Natural resources, Abiotic and Biotic resources, Principles of conservation of energy and management, Need of renewable energy, Growth of renewable energy in India and the world, Concept of waste management and recycling.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY

ENZYMOLOGY

CODE: 56010302

M.Sc 3rd SEM

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	4	**50**	**50**	**50**		**150**

Objectives:-

- The objectives of the paper is students will get about the protein structure, classification of enzymes, terminology, enzyme activity and purification of enzymes and strategy for separation and purification.
- The student will get idea about the enzyme kinetics and mechanism. What is significance of Km, Vmax and Kcat and importance of steady state equilibrium. Enzyme inhibition and its types. Thermal kinetics.
- To provide the mechanism and action of enzyme and its role of activators. Allosteric regulation and its mechanism.
- The study will help in understanding the what are isoenzymes and physiological significance role of different types of enzymes.

Course Outcome:

Unit	Description in Detail	Weightage (In Hours)
1	**Introduction**: Enzymology and historical developments in enzymology Protein Structure: Primary, secondary, tertiary and quaternary structure, techniques used in enzyme characterization Enzyme classification: IUB enzyme classification. Enzyme Activity: Principle and techniques of enzymatic analysis, factors affecting enzyme Activity, Extraction and Purification of enzyme: Objectives and strategy, separation techniques, test of purity.	08
2	**Enzyme Kinetics:** Bioenergetics and Catalysis Single substrate kinetics: Equilibrium and Steady state kinetics, significance of Km, Vmax & Kcat. Pre-steady state and Relaxation kinetics. Multisubstrate kinetics: General rate equation, compulsory order, random order and ping-pong mechanisms and their primary and secondary plots. Enzyme inhibition and its kinetics: Reversible and irreversible inhibition, competitive, noncompetitive and uncompetitive, mixed, partial, substrate and allosteric inhibition. Thermal kinetics: Effect of temperature on reaction rate, enzyme stability, Arrhenius equation and activation energy.	10
3	**Mechanism of Enzyme Action:** Enzyme activators, co-enzymes and co-factors in enzyme catalysis, Enzyme and substrate Specificity Investigation of active Centre, Factors affecting catalytic efficiency, Experimental approaches to determine enzyme mechanisms. Enzyme mechanisms: Lysozyme, Chymotrypsin, Carboxypeptidase, Restriction endonuclease, Aspartate trans carbomylase. Allosteric enzymes and sigmoidal	10

	kinetics: Protein ligand binding, Co-operativity, MWC & KNF models, Regulation of enzyme activity. Control of metabolic pathways.	
4	Isoenzymes and its physiological significance, Ribozymes and Abzymes Enzyme engineering: Chemical modification of enzymes: methods of modification of primary structure, catalytic and allosteric properties, use of group specific reagents. Enzyme Immobilization Enzymes in non conventional media, Enzymes sensors, Enzymes as analytical reagents.	08

Learning Outcomes:

- The students will be able to understand and deals with the biochemical nature and activity of enzymes and is a subject that has relevance to students from a wide range of disciplines.
- Student should be able to understand basic concepts of the present day scope and applications of enzymology.
- The course is designed to give students an understanding of procedures involved in purification of enzymes, enzymes assays and quantitative evaluation of the influencing parameters such as concentrations of substrate / enzyme, pH, temperature and effects of inhibitors on enzyme activity.
- This is a course where the topics to be studied include enzyme active sites / mechanisms of enzyme action; enzyme kinetics and regulation; Isozymes and their clinical significances /function relationship etc as tools for understanding functions of enzymes.

Teaching & Learning Methodology

- We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.
- The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:
- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs

- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Basic Text & Reference Books:

1. *Enzymes: Biochemistry, Biotechnology, Clinical Chemistry 2nd Edition,* authored by Trevor Palmer and Philip Bonner Affiliated East-West Press Pvt. Ltd.
2. Textbook of biochemistry – Vasudevan Shreekumari
3. Biochemistry – Lehninger 6th edition
4. Fundamentals of Enzymologist: Nicholes C. Price and Lewis Stevens, Oxford Univ. Press.
5. Enzyme Structure and mechanism: Alan Fersht, Reading, USA.
6. The chemical kinetics of enzyme action: K. J. Laider and P. S. Bunting, Oxford University Press,London.
7. Enzymes: M. Dixon, E. C.Webb, CJR Thorne and K. F. Tipton, Longmans, London.
8. Biochemistry: Lubert Stryer

E-Resources

- https://www.feedspot.com/infiniterss.php?_src=feed_title&followfeedid=4812449&q=site:https%3A%2F%2Fwww.nature.com%2Fsubjects%2Fbiochemistry.rss
- https://www.sciencedaily.com/news/matter_energy/biochemistry/
- https://thebiochemistblog.com/
- https://www.longdom.org/microbial-biochemical-technology.html
- https://bmcbiochem.biomedcentral.com/
- https://www.slideshare.net/mohdsakharkar/enzyme-final

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY

Immunology
Subject Code: 56010303
M.SC. Semester -3

Teaching & Evaluation Scheme

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	50	50	50	-	150

Objectives

- To provide students the basic knowledge of immunity, system of immunology, interaction of Ag-Ab.
- The purpose of the course is to give student to introduction of Types of immunity, antigen- antibody reaction, Hypersensitivity reaction etc.
- To provide an understanding of immune system in the body, types of cells etc..

Prerequisites

Student Must have studied M.Sc. with microbiology as a major subject and knowledge of basic Immunology and medical microbiology.

Course outline

Sr. No.	Course Contents	Teaching hours
1.	Adaptive immunity and innate immunity: inflammation, role of cells, receptors and proteins in innate immunity, ubiquity of the innate system. Cells and organs of the immune system: Hematopoiesis, cells of the immune system, primary and secondary lymphoid organs. Antigens and antibodies: properties of immunogens, haptens, epitopes, structure and classes of immunoglobulins, biological activities and effector functions, monoclonal antibodies and anzymes. Antibody diversity: models, organization of Ig genes, mechanism of gene rearrangement, generation of diversity; expression, synthesis and class switching, antibody engineering.	10
2.	Antigen-antibody interactions: principles and applications. Complement: components of the system, activation, regulation, biological consequences and deficiency diseases. Major histocompatibility complex and antigen presentation: MHC-organization, inheritance, genes, molecules and peptide binding, expression, disease susceptibility, immune responsiveness, self MHC restriction, cytosolic and endocytic pathway for antigen processing.	10
3.	T-cell receptor, T-cell maturation, activation and differentiation: TCR- genetic organization and rearrangement of genes, TCR-complex, peptide binding, thymic selection, activation and differentiation of T cells. Generation, activation and differentiation of B cells: B cell maturation, activation and proliferation, germinal centres, regulation of the responses. Cytokines: properties, receptors, associated diseases, therapeutic applications. Leukocyte activation and migration: CAM, chemokines, recirculation and extravasation, inflammation and anti-inflammatory agents. Cell mediated cytotoxicity: effector T cells, cytotoxic T cells, NK cells, ADCC.	10
4.	Hypersensitivity reactions: classification and types of hypersensitivity reactions. Immune tolerance and autoimmunity: establishment and failure of tolerance, autoimmune diseases, mechanisms for the induction, animal models, treatment. Transplantation immunology: basis and manifestation of graft rejection, immunosuppressive therapy, immune tolerance. Cancer and immune system. Immunodeficiency.	10

Learning Outcomes

- The students will be able to understand the Knowledge of the types of immune system , Ag-Ab reaction techniques in the body ,hypersensitivity reaction etc.
- Student should be able to understand basic concepts of immunity and types of the cell, classification of the hypersensitivity :its types and function.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- At the end of the course the student would have basic knowledge of immunity, system of immunology, interaction of Ag-Ab.

Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Books Recommended

- Kuby-Immunology: T. J. Kindt, R. A. Goldsby and B. A. Osborne; W. H. Freeman
- Janeway's Immunology: K. Murphy, P. Travers and M. Walport; Garland Sciences
- Immunology: Ivan Roitt, J. Brostoff and D. Male; Mosby
- Essential immunology: Ivan Roitt; Oxford: Blackwell
- Topic related review articles.

E-Resources

- https://www.slideshare.net/mobile/Jsjahnabi/types-of-immunity
- https://www.slideshare.net/mobile/mprasadnaidu/immunity-32908889
- https://www.slideshare.net/mobile/ArunimaSur/antigen-antibody-interaction-55880086
- https://www.slideshare.net/mobile/VELSPHARMD/hypersensitivity-24449005
- https://www.slideshare.net/mobile/VamsiIntellectual/types-of-cells-and-tissues

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF BIOTECHNOLOGY
MICROBIAL BIOTECHNOLOGY
CODE: 56010301
M.Sc 3rd SEM

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	8	50	20	50	30	150

Objectives:-To provide basic knowledge of Microbial Biotechnology. It covers up general concept of microbial biotechnology and fermentation of various products.

Unit	Description in Detail	Weightage (In hours)
1	Microbial production of Amino acids: Glutamic acid, Lysine Industrial Alcohol, Beer and wine Vitamins: Vit B12, B2 Ergot alkaloids	08
2	General concept of Microbial biotechnology Microbial production of Antibiotics: penicillin, streptomycin Enzymes: proteases, amylases Organic acids: Citric acid, acetic acid	08
3	**Biotransformations of steroids:**	

	Production of single cell protein from bacteria, fungi and algae: Nutritional value and safety. Edible Mushrooms: Cultivation of edible and medicinal mushrooms. Bioplastics Single cell oil	08
4	**Microbial Exopolysaccharides:** Xanthan, Alginate Microbial Flavours: Diacetyl, Methyl ketones, Terpenes, Vanillin Fermented food and dairy products: Starter cultures, science and technology of bread, cheese and yogurt manufacture.Fermentation economics	10

Basic Text & Reference Books:

1. Biotechnology: Rehm and Reid.
2. Comprehensive biotechnology: Murray Moo Young.
3. Microbial Technology: Pepler
4. Microbiology and technology of fermented foods: R.W. Hutkins. Blackwell publishing.

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY

Plant Biotechnology
Subject Code: 56010401
M.Sc. Semester-4

Teaching & Evaluation Scheme

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
4	-	2	6	4	**30**	**--**	**70**		**100**

Objectives

- To provide basic knowledge of plant biotechnology, secondary metabolites and about genetic engineering technology.
- To provide basic knowledge of Plant Biotechnology. It covers up about cell & tissue culture, methods of propagation, plant tissue culture.
- The present course opens the door to all of the abundant careers in and out of the area of biological sciences including health/ medical / Environmental Sciences.

Prerequisites

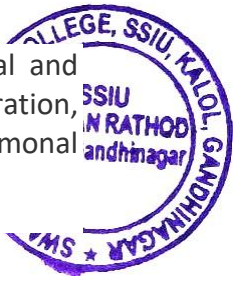
Student must have studied B.Sc with microbiology/Biotechnology as a major subject and knowledge of basic microbiology.

Course outline

Sr. No.	Course Contents	Teaching hours
1	Cell & tissue culture in plants; callus cultures; in-vitro morphogenesis organogenesis and embryogenesis; Artificial Seeds, Micropropagation (Clonal propagation); Haploidy; anther and ovule cultures, Embryo cultures; Protoplast isolation, culture and protoplast fusion and somatic hybridization, Cybrids, Somaclonal Variation; in-vitro mutation methods; Virus elimination, pathogen indexing; Cryopreservation	08
2	Production of secondary metabolites; Sources of plant secondary metabolites; criteria for cell selection, factors affecting the culture of cells; different bioreactors and their use in secondary metabolite production; biochemical pathways for the production of different secondary metabolites; and biotransformation.	06
3	Principles and methods of genetic engineering, and its applications in Agriculture. Methods for genetic transformation and transgenic plants production through Agro bacterim tumefaciens and A. rhizogenes; Gene transfer methods in plants; PEG mediated, microinjection, particle bombardment, electroporation, Molecular markers and their importance in plant breeding, Marker Assisted Selection (MAS).	10
4	Molecular plant pathology: Mechanisms of disease resistance in plants against pathogens; Signalling pathways and molecular events during pathogen – plant interaction. Biotechnology and intellectual property rights (IPR); Plant genetic resources GATT & TRIPS; Patent for higher plant genes and DNA sequence	08

Learning Outcomes

- The aim of this course is to provide a thorough understanding of theoretical and practical aspects of plant cell and tissue culture. Topics include: plant regeneration, genetic modification, cellular & physiological aspects of differentiation and hormonal regulation of differentiation.



- Student should be able to understand Explain basic metabolic pathways of plants and formation of different secondary metabolites through various biosynthetic pathways in plants

- The course is designed to give students an understanding of the students will have knowledge of tools and strategies used in genetic engineering. Understanding of applications of recombinant DNA technology and genetic engineering. from academic and industrial perspective

- The students will learn how to select and apply the methodologies to be used in molecular plant pathology

Teaching & Learning Methodology

- We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.
- The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:
- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Books Recommended

- Elements of Biotechnology – P K Gupta

- Principles of plant biotechnology: An introduction to genetic engineering in plants – S H Mantel, et. al.

- Advances in Biochemical engineering / Biotechnology – Anderson, et. al.

- Plant cell culture technology – M M Yeoman

E-Resources

- https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/plant-biotechnology
- https://en.wikipedia.org/wiki/Genetic_engineering#:~:text=Genetic%20engineering
- https://bsppjournals.onlinelibrary.wiley.com/journal/13643703
- https://www.slideshare.net/abhishekindurkar/production-of-secondary-metabolite
- https://www.slideshare.net/VamsiIntellectual/types-of-cells-and-tissues

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY
ENVIRONMENTAL BIOTECHNOLOGY
CODE: 56010402
M.Sc 4th SEM

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	**6**	**50**	**50**	**50**		**150**

Objectives:-

- To provide knowledge about environment monitoring, its assessment using bio-indicators, biomarkers, biosensors and toxicity testing. Various environmental laws.
- Student will an get idea about bioremediation techniques, strategies involved in bioremediation. Phytoremediation, GMO and impact on bioremediation.
- To provide an idea about principles of biodegradation and mechanism of detoxification, biodegradation of various compounds like detergents, pesticide, lignin, hydrocarbon and dyes.
- Provide knowledge about Principles and mechanisms of biodeterioration, Methodology to assess biodeterioration, Prevention and control of biodeterioration, Biodeterioration of selected material.

Prerequisites

Student must have studied B.Sc with microbiology/Biotechnology as a major subject and knowledge of basic microbiology.

COURSE OUTLINE:

Unit	Description in Detail	Weightage
1	**Environmental problems and monitoring:** Environmental monitoring: environmental impacts and their assessments using bio-indicators, biomarkers, biosensors and toxicity testing, rDNA technology, Conservation strategies, Environmental laws and policies in India	06
2	**Bioremediation:** Bioremediation principles, Strategies and techniques of bioremediation: *in situ* and *ex situ,* Bioremediation of metals, Phytoremediation, GMOs and their impact on bioremediations	06
3	**Biodegradation:** Principles of biodegradation and mechanism of detoxification, Biodegradation of detergent, pesticide, lignin, hydrocarbon and dyes	10
4	**Biodeterioration:** Principles and mechanisms of biodeterioration, Methodology to assess biodeterioration, Prevention and control of biodeterioration, Biodeterioration of selected materials	10

Learning Outcomes

- To provide knowledge about environment monitoring, its assessment using bio-indicators, biomarkers, biosensors and toxicity testing. Various environmental laws.
- Student will an get idea about bioremediation techniques, strategies involved in bioremediation. Phytoremediation, GMO and impact on bioremediation.

- To provide an idea about principles of biodegradation and mechanism of detoxification, biodegradation of various compounds like detergents, pesticide, lignin, hydrocarbon and dyes.
- Provide knowledge about Principles and mechanisms of biodeterioration, Methodology to assess biodeterioration, Prevention and control of biodeterioration, Biodeterioration of selected material.
-

Teaching & Learning Methodology

- We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.
- The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:
- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Books Recommended

1. Biotechnology- U. Satyanarayana
2. Environmental engineering and management- S. K. Dhameja, Publ: Kataria & Sons
3. Textbook of Biotechnology- H.K.Das
4. Methods in Biotechnology- Hans-peter-schmauder
5. Environmental Biotechnology- B.C. Bhattacharyya and R. Banerjee
6. Environmental biotechnology- G. M. Evans and J. C. Furlong
7. Environmental biotechnology- A. Scragg, Oxford

E-Resources

1. https://www.slideshare.net/Omodhu/bioremediation-71688629
2. https://www.slideshare.net/vanithagopal/bioremediation-41934065
3. https://www.slideshare.net/halalarahman/phytoremediationppt
4. https://www.slideshare.net/Christa_belle/phytoremediation-43828173
5. https://www.slideshare.net/tanujanautiyal/environmental-biotechnology-50099488

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF Chemistry

Industrial Chemistry
Subject Code: 56020304
M.Sc. Semester - III

Teaching & Evaluation Scheme

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	-	4	4	30	-	70	-	100

Objectives

- The students will understand the interdisciplinary nature of chemistry and to integrate knowledge.
- The students will develop the ability to effectively communicate scientific information and research results in written and oral formats.

Prerequisites

Chemistry majors must have a basic understanding of fundamental organic chemistry.

Course outline

Sr. No.	Course Contents	Teaching hours
1	**Basic principles** Basic chemical data, batch versus continuous operation, design, flow charts, chemical process selection, safely, hazardous, fire toxic materials, research and development patents, good manufacturing	14

	practice and laboratory practice.	
2	**Unit processes in organic chemistry** Nitration, sulfonation, halogenation, amination and alkylation methods and industrial chemicals derived from benzene, naphthalene and anthracene using unit process.	14
3	Green chemistry -12 principles of green chemistry Green solvents- aqueous phase reactions Wurtz reaction, witting-Horner reaction, Michael reaction - - Ionic liquid as green solvent- hydrogenation, diels-alder reaction, o- alkylation and N-alkylation Green catalysts of green reagents (introduction)	14
4	Manufacture and uses of -Argochemics (insecticides, fungicides, plant nutrients and plant hormones, Weedicides, pesticides) -Unit operations	14

Learning Outcomes

- At the end of the course the student would have sufficient knowledge of Organic Chemistry.
- Students will be able to design and carry out scientific experiments as well as accurately record and analyze the result of such experiments.

Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programmer/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs.

- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programmer/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include group work, with groups representing diverse cultures.

Books Recommended

1. Unit processes in organic synthesis by P.H.Groggins
2. Industrial Chemical process by R.N.Shreve
3. Riegels handlook of industrial chemistry ed by James and Kent
4. Dryden's outlines of chemical Technology M.Gopal Rao

E-Resources

- http://ccc.chem.pitt.edu/wipf/Web/HCH.pdf
- https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Supplemental_Modules_(Organic_Chemistry)/Arenes/Reactivity_of_Arenes/Nitration_and_Sulfonation_of_Benzene
- https://www.masterorganicchemistry.com/2018/04/30/electrophilic-aromatic-substitutions-2-nitration-and-sulfonation/
- https://www.azocleantech.com/article.aspx?ArticleID=559

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

Medicinal Chemistry
Subject Code: 56020302
M.Sc. Semester- III

Teaching & Evaluation Scheme

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	-	4	4	30	-	70	-	100

Objectives

- The students will understand the interdisciplinary nature of chemistry and to integrate knowledge.
- The students will develop the ability to effectively communicate scientific information and research results in written and oral formats.

Prerequisites

Chemistry majors must have a basic understanding of fundamental organic chemistry.

Course outline

Sr. No.	Course Contents	Teaching Hours
1	**Antibiotics** Antibiotics that interfere with the biosynthesis of bacterial cell wall. A. The β -lactum antibiotics : Penicillin and cephalosporin B. Non lactum antibiotics (only name and structures) C. Bacitracin, vancomycin and cycloserine (only name and	14

	structures) Antibiotics that interfere with the protien biosynthesis in microorganisms : non lactum antibiotics, tetracycline, chloroamphenicol Structure actively relationship (SAR) among penicillinis and tetracyclins Non classifiable antibiotics (only structure and therapeutic uses) Synthesis of pencillin V, ampicillin, cephalosporin and chloroamphenicol.	
2	**Psychoactive drugs** CNS depressant: **A**. General and local anaesthetics **B.** Sedative and hypnotics Antipsychotic drugs **A.** Antidepressant **B.** Neuroleptics Synthesis of the following: Thiopental, amobarbital, diazepam, chlorozepan, alprazolam, glutethimide, nikethamide, procaine, lidocaine and dibucaine, Ibuprofin, meclofenate sodium, novalgin, pethidine	14
3	**Antimalarial and Antituberculosis drugs** Antimalarials: Modern chemotherapy of malaria, 4-amino and 8-amino quinolins, 9-amino acridine. Synthesis of mefloquines, chloroquine, primaquine and daraprim Mode of action of antimalarial agents SAR of antimalarial agents Anti tuberculosis: Synthesis of only the following drugs: Isoniazid (INH), Ethionamide, Ethambutol, DDS (Dapsone)	14
4	**Cardiovascular, diuretics and hypoglycemic agents** Synthesis of amyl nitrate, diltiazim, atenolol, methyl dopa, tolbutamide, chloropropamide, glibenclamide, acetazolamide, chlorothiazide, furosemic and ethacrycnic acid.	14

Learning Outcomes

- At the end of the course the student would have sufficient knowledge of Organic Chemistry.
- Students will be able to design and carry out scientific experiments as well as accurately record and analyze the result of such experiments.

Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programmer/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs.
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- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programmer/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include group work, with groups representing diverse cultures.

Books Recommended

1. Burger's medicinal chemistry and drug design (5/e) 1997, vol 1 to 5 edited by Manfred E.Woltt (John wiley and sons Mc. New york)

2. Principles of medicinal chemistry by William A. Foye (ied), lea and febiys (Philadelphia)

3. Principles of medicinal chemistry vol I & II (5/e) F.S.kadam, K.R. Mahadic ad K.G.Bohra (Nirali publication)

4. Medicinal chemistry by ashutosh kar

5. The organic chemistry of drug synthesis vol I, II and III (1980) ed by D. lednicer and L.A. mitscher (Johyn wiley and sons, New york)

6. Wilson and Gisvold text book of organic medicinal and pharmaceutical chemistry (5/e,1982) by Robert Doerge (J.B. lippincoff company, phaladophia/ Toppan co.Ltd, Tokyo)

7. Topics in medicinal chemistry vol I & II by rabinowitz Myerson (interscience 1968)

8. The pharmaceutical basis of theraperutics by Geoman and Gilman (Mcmillan co.)

E-Resources

- https://www.medicalnewstoday.com/articles/10278
- https://www.drugs.com/article/antibiotics.html
- https://medlineplus.gov/antibiotics.html
- https://patient.info/infections/antibiotics-leaflet
- http://www.vivo.colostate.edu/hbooks/pathphys/endocrine/basics/steroidogenesis.html
- https://www.qmul.ac.uk/sbcs/iupac/class/terp.html

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

Department of Chemistry

Natural Products and Bio-molecules

Subject Code: 56020301

M.Sc. Semester- III

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	-	4	4	30	-	70	-	100

Objectives

- The students will understand the interdisciplinary nature of chemistry and to integrate knowledge.
- The students will develop the ability to effectively communicate scientific information and research results in written and oral formats.

Prerequisites

Chemistry majors must have a basic understanding of fundamental organic chemistry.

Course outline

Sr. No.	Course Contents	Teaching Hours
1	**Natural Pigment** Natural colouring matter, general classification, method of synthesis, biosynthesis studies of anthocyanins (cyanine) flavones (chryosin) and flavanol (Querecetin), Porphyrin-structure, spectral properties and synthesis, general and structure determination of Haemoglobin, chlorophyll and Bilirubin.	14

2	**Alkaloids and Vitamins** Alkaloids: General biogenetic studies of alkaloids, chemistry of quinine, morphine , reserpine and colchicine Vitamins : Introduction, synthesis and biochemical function of vitamin B(Thiamine), Vitamin H and α -tocopherol (Vitamin E), vitamin C.	14
3	**Steroids and Hormones** General biosynthesis studies of steroids, structure of cholesterol and ergosterol (No synthesis). Stereochemistry of steroids, chemistry of bile acids. Chemistry of androgens, oestrogens and gestrogens, their synthesis and biochemical role. Adrenocortical hormones, partial synthesis of cortisone.	14
4	**Terpenoids and Carotenoids** Classification, nomenclature, general methotds of structure determination, chemistry and synthesis of abietic acid and gibberellic acid (gibberllin-A), farnesol, zingeberine and squalene. Biosynthetic studies on triterpenoids and tetraterpenoides.	14

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SWARNIM SCIENCE COLLEGE, SSIU, KALOL, GANDHINAGAR
SSIU
BHOYAN RATHOD
Kalol, Gandhinagar

Learning Outcomes

- At the end of the course the student would have sufficient knowledge of Organic Chemistry.

- Students will be able to design and carry out scientific experiments as well as accurately record and analyze the result of such experiments.

Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programmer/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs.

- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.

- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.

- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programmer/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

- Include group work, with groups representing diverse cultures.

Books Recommended:

1. Organic chemistry vol I & II (sixth edition) I.L.Finar
2. Chemistry of vitamins-S.F.Dyke

3. Chemistry of natural products by Bantely, Vol 1-10
4. L.J.Wade Jr. Organic chemistry, Prentice nall, England cliffs, 1987
5. Chemistry of Natural products vol I & II by O.P.Agrawal

E-Resources

- https://www.invaluable.com/blog/naturalpigments/#:~:text=A%20natural%20pigment%20is%20one,to%20create%20a%20desired%20hue.&text=Artists%20used%20whatever%20pigment%20was,and%20white%20from%20ground%20calcite.
- https://www.foodcolor.com/natural-pigments
- https://www.britannica.com/science/alkaloid
- https://en.wikipedia.org/wiki/Steroid_hormone
- https://www.gfmer.ch/Books/Reproductive_health/Steroid_hormone_metabolism.html
- https://conagen.com/products-we-make/terpenoids-carotenoids/

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

Organic Spectroscopy
Subject Code: 56020303
M.Sc. Semester- III

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
4	-	-	4	4	30	-	70	-	100

Objectives

- The students will understand the interdisciplinary nature of chemistry and to integrate knowledge.
- The students will develop the ability to effectively communicate scientific information and research results in written and oral formats.

Prerequisites

- Chemistry majors must have a basic understanding of fundamental organic chemistry.

Course outline

Sr. No.	Course Contents	Teaching Hours
1	**UV & IR Spectroscopy** UV: Electronic transitions, chromophores, auxochromes, bathochromic and hypsochromic shifts, solvent effects, wood ward fieser rules for dienes, enones and aromatic compounds applications of U.V., instrumentation. I.R. Vibrational transitions, important group frequencies, factors affecting I.R. group frequency, applications of I.R. instrumentation	14

2	**NMR** Elementary ideas of NMR integration, chemical shifts, Factors affecting, chemical shifts, coupling (first order, analysis) instrumentation and principles and instrumentation, FT, chemical shifts, spin-spin coupling different spin systems, mechanism of spin coupling. E.q. AB, ABX, factors affecting vicinal and geminal couplings, rate processes, long range couplings, spin decoupling, shift reagents, solvent shifts, nuclear overhauser effect. 2D NMR (COSY and HETCOR) applications.	14
3	**C13 NMR and Mass spectrometry** C13 NMR: elementary ideas, instrumental problems ,chemical shift features of hydrocarbons, effect of substituent on chemical shifts olefinic, acetylenic, aromatic and carbonyl carbons, effects of coupling. Mass spectrometry: theory, instrumentation, modes of ionization, types of detectors, modes of fragmentation. Different types of ions, molecular ions, isotopic peaks, factors controlling fragmentation, hyphenated mass spectroscopy techniques.	14
4	Structural elucidation of drug molecules based on joint application of UV, IR, PMR, CMR and mass spectroscopy.	14

Learning Outcomes

- At the end of the course the student would have sufficient knowledge of Organic Chemistry.
- Students will be able to design and carry out scientific experiments as well as accurately record and analyze the result of such experiments.

Teaching & Learning Methodology:-

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programmer/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs.
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.

- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programmer/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include group work, with groups representing diverse cultures.

Books Recommended:

1. Spectroscopic methods in organic chemistry, D.H.Williams and Tan fleming
2. Spectrometric identification of organic compounds, T.C.Morril R.M.Silverstein and G.Bassler, 6th edition, John Wiley and sons
3. Introduction to spectroscopy, D.L.Pavia, G.M.Lampman and G.S.Kriz, 3rd edn, Harcourt college publishers.
4. Organic spectroscopy by W.Kemp
5. Organic spectroscopy by P.S.Kalsi

E-Resources

- https://www.itwreagents.com/iberia/en/sa_spectroscopy-uv-vis-ir#:~:text=The%20UV%2DVis%20spectroscopy%20is,between%20200%20and%20800%20nm).&text=The%20IR%20spectroscopy%20is%20another%20very%20useful%20analytical%20tool%20for%20compounds%20characterization.
- https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Book%3A_Analytical_Chemistry_2.1_(Harvey)/10%3A_Spectroscopic_Methods/10.03%3A_UV/Vis_and_IR_Spectroscopy
- https://www.mps.mpg.de/phd/space-instrumentation-ir-uv-spectroscopy
- https://www.youtube.com/watch?v=MW4PwJxxyt0
- https://www.youtube.com/watch?v=t5stvnKNXbg
- https://www.youtube.com/watch?v=t5stvnKNXbg
- https://www.youtube.com/watch?v=H6_GgJN39vY
- https://www.youtube.com/watch?v=EZzYXmX8XGk
- http://sppu.in/Syllabi_PDF/revised_2009/sci/6%20%20(5)%20%20M.Sc.%20II,%20%20Drug%20Chemistry.pdf
- https://www.researchgate.net/post/Which_is_the_best_spectroscopic_method_for_the_structure_elucidation_of_organic_molecule_without_the_help_of_other_method

- https://www.arcjournals.org/pdfs/ijarcs/v2-i8/5.pdf
- https://www.sydney.edu.au/science/chemistry/~george/spectroscopy.html
- https://nptel.ac.in/content/storage2/courses/104106075/Week8/MODULE%2036.pdf

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

Department of Chemistry

Advanced Organic Chemistry
Subject Code: 56020401
M.Sc. Semester- IV

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-		4	4	30		70	-	100

Objectives

- The students will understand the interdisciplinary nature of chemistry and to integrate knowledge.
- The students will develop the ability to effectively communicate scientific information and research results in written and oral formats.

Prerequisites

Chemistry majors must have a basic understanding of fundamental Organic Chemistry.

Course outline

Sr. No.	Course Contents	Teaching Hours
1	**Pericyclic Reactions** Introduction, classification of pericyclic reactions, stereochemistry, molecular orbital symmetry, frontier orbitals of ethelene, 1,3 – butadiene, 1,3,5-hexatriene and allyl system, F.M.O. and PMO approach to cycloaddition and electrocyclic reactions: Generalisation of wood-ward Hoffmann rule, sigmatropic rearrangement-suprafacial and antrafacial shifts of	14

	H.Stereoselectivity in sigmatropic rearrangement, enantioselectinity in pericyclic reactions.	
2	**Conformational Analysis** Confirmation at cyclic systems: Confirmation of cyclohexane, mono and disubstituted cyclohexane, heterocyclic compounds, five and six membered heterocycles, stereoelectronic effects, fused bicyclic sptem, decalin, dodecalin, polyclin system, perhydrophenanthrene, bridged systems-conformation of sugars, steric strains due to unavoidable crowding, stereochemistry of the compounds containing nitrogen, sulphur and phosphorous.	14
3	**Oxidation** Introduction, different oxidation processes, hydrocarbons-alkenes, aromatic rings, saturated C-H group (activated and unactivated), alcohols, diols, aldehydes, ketones, amines, hydrazine and sulphides.	14
4	**Reduction** Introduction, different reductive processes, hydrocarbons-alkanes, alkenes, alkynes and aromatic rings, Carbonyl compounds-aldehydes, ketones, acids and their derivatives, epoxides, nitro, nitroso, azo and oxime groups, Preparation and properties and application of pd and Ti compounds as organometallic agents	14

Learning Outcomes

- At the end of the course the student would have sufficient knowledge of Organic Che..

  mistry.

- Students will be able to design and carry out scientific experiments as well as accurately record and analyze the result of such experiments.

Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programmer/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs.

- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.

- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.

- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programmer/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

- Include group work, with groups representing diverse cultures.

Books Recommended:

1. Advance organic chemistry by Jerry March
2. Advance organic chemistry by Carey and Sundberg,
3. Advance organic chemistry by Francis A. carey

E-Resources

- https://www.youtube.com/watch?v=oio3RJHAxOw

- https://www.asu.edu/courses/chm332/PericyclicReactions.pdf

- https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Supplemental_Modules_(Organic_Chemistry)/Reactions/Pericyclic_Reactions

- https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Book%3A_Basic_Principles_of_Organic_Chemistry_(Roberts_and_Caserio)/21%3A_Resonance_and_Molecular_Orbital_Methods/21.11%3A_Pericyclic_Reactions

- https://courses.lumenlearning.com/suny-potsdam-organicchemistry/chapter/conformational-analysis/#:~:text=Conformational%20analysis%20is%20the%20study,through%2Dspace%20interactions%20of%20substituents.

- https://www.ch.ic.ac.uk/local/organic/conf/c1_definitions.html

- https://www.youtube.com/watch?v=ua0_UNoashU

- https://www.thoughtco.com/definition-of-oxidation-in-chemistry-605456#:~:text=Oxidation%20is%20the%20loss%20of,%2C%20molecule%2C%20or%20ion%20decreases.

- https://www.chemguide.co.uk/inorganic/redox/definitions.html

- https://www.khanacademy.org/science/ap-chemistry/redox-reactions-and-electrochemistry-ap/redox-oxidation-reduction-tutorial-ap/v/introduction-to-oxidation-and-reduction

- https://chemed.chem.purdue.edu/genchem/topicreview/bp/ch9/redox.php

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

Advanced Organic Synthesis
Subject Code: 56020402
M.Sc. Semester- IV

Teaching & Evaluation Scheme

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
4	-		4	4	30		70	-	100

Objectives

- The students will understand the interdisciplinary nature of chemistry and to integrate knowledge.
- The students will develop the ability to effectively communicate scientific information and research results in written and oral formats.

Prerequisites

Chemistry majors must have a basic understanding of fundamental Organic Chemistry.

Course outline

Sr. No.	Course Contents	Teaching Hours
1	**Protection of groups** Principle of protection of hydroxyl, amino, carbonyl, carboxylic acid with different reagents and their deprotection, synthetic equivalent groups, synthetic analysis and planning, control of stereochemistry.	14
2		14

	Disconnection approach An introduction to synthesis, and synthetic equivalents, disconnection approach, functional group inter-conversions, the importance of the order of events in organic synthesis one group C-X and two group C-X disconnections, chemo-selectivity, reversal and polarity.	
3	**One group C-C disconnections** Alcohols and carbonyl compounds, region-selectivity, alkene synthesis, use of acetylenes and aliphatic nitro compounds in organic synthesis.	14
4	**Ring synthesis** Saturated heterocycles, synthesis of 3, 4, 5, and 6-membered rings, aromatic heterocycles in organic synthesis.	14

Learning Outcomes

- At the end of the course the student would have sufficient knowledge of Organic Chemistry.
- Students will be able to design and carry out scientific experiments as well as accurately record and analyze the result of such experiments.

Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

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- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at

the start of a programmer/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

- Include group work, with groups representing diverse cultures.

Books Recommended

1. Organic synthesis: the disconnection approach by stuart Warren (wiley student edition)

2. Organic chemistry- clayden, greeves, warren and wothers, (oxford press)

E-Resources

- https://www.organic-chemistry.org/protectivegroups/
- https://en.wikipedia.org/wiki/Protecting_group#:~:text=A%20protecting%20group%20or%20protective,role%20in%20multistep%20organic%20synthesis.&text=This%20step%20is%20called%20deprotection.
- http://www.chem.ucalgary.ca/courses/351/Carey5th/Ch17/ch17-3-4-3.html
- https://www.youtube.com/watch?v=YYC_vbrgZDY
- https://mazams.weebly.com/uploads/4/8/2/6/48260335/organic_synthesis_the_disconnection_approach_2nd_edition_by_stuart_warren.pdf
- https://www.chemistry.tcd.ie/assets/pdf/sfchemistry/tg/HandoutsSFLectureSinIntroductiontoOrganicChemistry2009.pdf
- http://rushim.ru/books/uchebnik/Warren.pdf
- https://www.slideshare.net/dragnerkar/retrosynthesis-agn-compatibility-mode
- https://www.slideshare.net/RabiaAziz6/retrosynthesis-122337747
- https://www.vanderbilt.edu/AnS/Chemistry/Rizzo/chem223/rings6.pdf

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

Bio-organic Chemistry
Subject Code: 56020403
M.Sc. Semester- IV

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-		4	4	30		70	-	100

Objectives

- The students will understand the interdisciplinary nature of chemistry and to integrate knowledge.
- The students will develop the ability to effectively communicate scientific information and research results in written and oral formats.

Prerequisites

Chemistry majors must have a basic understanding of fundamental organic chemistry.

Course outline

Sr. No.	Course Contents	Teaching Hours
1	**Water and vitamins** Water –interaction among biomolecules in aqueous systems, buffering against pH changes, in biological systems, participation of water in biological reactions. Vitamins-classification, introduction, chemistry, absorption transport, mobilization and biochemical functions of Vitamins A, D, E, K, C, B, B2, B6, H and folic acid	14

2	**Proteins and enzymes** **Proteins:** properties and conventions of common amino acids, stereoisomerism in α -amino acid, Peptides: formation, compositions and sizes of protein separation, purification and characterization, sequencing of peptides, sanger's method, edman degradation, outline of other methods, protein sequences and evolution. Oxygen binding proteins, haemoglobin and myoglobin in oxygen transport and storage. **Enzymes:** classification, nomenclature and extraction factors affecting catalytic activity and specificity in action, regulation of enzyme activity, enzyme inhibition, illustrative enzymatic reactions using chymotropsin, hexokinase, enolase and lysozyme	14
3	**Carbohydrates and nucleic acid** **Carbohydrates:** classification and stereochemistry, biologically important hexose derivatives, nomenclature of disaccharides, structure and role of some homo and hetero polysaccharides, glucoconjugates : proteoglycans, glycoproteins and glycolipids **Nucleic acid:** compounds of nucleic acids, nomenclature of nucleotides, nucleosides, structure of DNA and structure of RNA	14
4	**Lipids** Nomenclature, structure and physical properties of some naturally occurring fatty acids, triacelglycerol and waxes as sources of stored energy, insulation of water repellants, types of membrane lipids, introduction to glycerophospho lipids, galactolipids, sphingo lipids, phospholipids and sterols, bile acids.	14

Learning Outcomes

- At the end of the course the student would have sufficient knowledge of Organic Chemistry.
- Students will be able to design and carry out scientific experiments as well as accurately record and analyze the result of such experiments.

Teaching & Learning Methodology:-

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- Include group work, with groups representing diverse cultures.

Books Recommended:

1. Principles of biochemistry –Donald J.Voet, Judish G.Voet, charlotte w. pratt (John willey and sons)
2. Lehninger principles of biochemistry- David L.Nelson and Michael M.wx (Palgrave Macmillan / w.h. freeman company new york)
3. 3. Biochemistry – U.Satyanarayana Baro and allied P.Ltd., kolkata

E-Resources

- https://kidshealth.org/en/teens/vitaminsminerals.html#:~:text=The%20water%2Dsoluble%20vitamins%20%E2%80%94%20C,can't%20store%20these%20vitamins.
- https://www.healthline.com/nutrition/water-soluble-vitamins
- https://www.who.int/water_sanitation_health/dwq/nutrientschap13.pdf
- https://www.freedrinkingwater.com/water-education3/34-water-vitamins.htm
- https://www.medicinenet.com/water_soluble_vitamins_vs_fat_soluble_vitamins/ask.htm
- https://extension.colostate.edu/topic-areas/nutrition-food-safety-health/water-soluble-vitamins-b-complex-and-vitamin-c-9-312/
- https://www.nature.com/scitable/topicpage/protein-function-14123348/#:~:text=Enzymes%20are%20proteins%2C%20and%20they,highly%20specific%20to%20their%20substrates.

- https://www.britannica.com/science/protein/Enzymes
- https://chem.libretexts.org/Bookshelves/Biological_Chemistry/Supplemental_Modules_(Biological_Chemistry)/Enzymes/3._Proteins_as_Enzymes
- https://www.ncbi.nlm.nih.gov/books/NBK9921/
- https://www.ncbi.nlm.nih.gov/books/NBK554481/
- https://www.chemistryworld.com/features/when-is-an-enzyme-not-a-protein/9471.article
- https://www.eufic.org/en/whats-in-food/article/what-are-proteins-and-what-is-their-function-in-the-body?gclid=CjwKCAiAq8f-BRBtEiwAGr3DgT6BNFSW9_FCSbEp-MsZi9Qa6QMyhx7TFmqrMcUCh3-mEhkPIVEDrBoClqkQAvD_BwE
- https://courses.lumenlearning.com/suny-wmopen-biology1/chapter/comparing-biologicalmacromolecules/#:~:text=Proteins%2C%20carbohydrates%2C%20nucleic%20acids%2C,bonds%20to%20form%20larger%20polymers.
- https://www.merckmillipore.com/IN/en/products/small-molecule-pharmaceuticals/formulation/bioavailability-enhancement/drug-delivery-compounds/lipids-for-pharmaceutical-applications/VWOb.qB.u3cAAAFRDikEZcsR,nav?gclid=CjwKCAiAq8f-BRBtEiwAGr3Dgf6VTAApDXutfsY1ChgvXv_K4x2sBJ0lSlPTYhIYtIrV-TLR276dFhoCxpUQAvD_BwE
- https://www.britannica.com/science/lipid
- https://www.khanacademy.org/science/biology/macromolecules/lipids/a/lipids

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF Chemistry

Selected topics in Medicinal Chemistry
Subject Code: 56020404
M.Sc. Semester - IV

Teaching & Evaluation Scheme

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-		4	4	30		70	-	100

Objectives

- The students will understand the interdisciplinary nature of chemistry and to integrate knowledge.
- The students will develop the ability to effectively communicate scientific information and research results in written and oral formats.

Prerequisites

- Chemistry majors must have a basic understanding of fundamental Organic Chemistry.

Course outline

Sr. No.	Course Contents	Teaching hours
1	**Drug design** Introduction, naming of organic medicinal compounds, literature of medicinal chemistry, development of new drugs, procedure followed in drug design, concept of lead compound and lead modification, pro drugs, soft drugs, phase I, II and III clinical trials,	14

	structure activity relationship, theories of drug activity : occupational theory, rate theory, induced fit theory, quantitative structure activity relationship, history and development of QSAR. Concept of drug receptors, elementary treatment of drug receptor interactions, physio chemical parameters lipophilicity, partition coefficient, electronic ionization constant, concept of 3-D QSAR.	
2	**Pharmacokinetic and pharmacodynamics** Pharmacokinetics: introduction to drug absorption, distribution, metabolism, elimination. important pharmacokinetic parameters in defining drug deposition and in therapeutics, uses of pharmaceutics in drug development process Pharmacodynamics: Introduction, elementary treatment of enzyme stimulation, enzyme inhibition, drug metabolism, biotransformation, significance of drug metabolism in medicinal chemistry.	14
3	**Dosage forms, Quality control and application of computers in chemistry** Dosage forms, types of dosages, different roots of administration, quality control of drugs pharmacopias, modern methods of pharmaceutical analysis. **Computer in chemistry** Use of computer in chemistry and industry Important websites for data search chemistry Information about online journals for chemistry	14
4	**Medicine** Overview, Medicinal use of nanomaterials-Drug delivery Protein and peptide delivery –cancer, surgery, visualization, nanoparticle targeting Medical application of molecular nanotechnology-nanorobots, cell repair machines, nanonephrology.	14

Learning Outcomes

- At the end of the course the student would have sufficient knowledge of Organic Chemistry.
- Students will be able to design and carry out scientific experiments as well as accurately record and analyze the result of such experiments.

Teaching & Learning Methodology

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- Include group work, with groups representing diverse cultures.

Books Recommended

1. Burger's Medicinal Chemistry and Drug Discovery (5/e), 1997, Vol. 1, 2, 3, 4,5, Edited by ManFred E. Wolff (John Wiley & Sons, inc., New York).

2. Wilson and Gisvold's Text-book of Organic Medicinal and Pharmaceutical Chemistry (5/e, 1982) by Robert F. Doerge (J. B. Lippincott Company, Philadelphia/Toppan Co. Ltd., Tokyo).

3. Principles of Medicinal Chemistry, Vol. I & II (5/e), by S. S. Kadam, K. R. Mahadik, K. G. Bothra (Nirali Prakashan).

4. QSAR: quantitative structure-activity relationships in drug design by Jean-Luc Fauchère. ISBN:084515141X, 9780845151419

5. QSAR : Hansch analysis and related approaches By Hugo Kubinyi

E-Resources

- https://en.wikipedia.org/wiki/Drug_design#:~:text=Drug%20design%2C%20often%20referred%20to,knowledge%20of%20a%20biological%20target.
- https://www.dovepress.com/journal-editor-drug-design-development-and-therapy-eic19
- https://www.pharmatutor.org/articles/drug-designing-review
- https://newdrugapprovals.org/drug-design/
- https://www.bioagilytix.com/blog/2020/10/05/the-difference-between-pharmacokinetics-and

pharmacodynamics/#:~:text=Pharmacokinetics%20is%20the%20study%20of,drug%20does%20to%20the%20body.&text=When%20referring%20to%20pharmaceuticals%2C%20pharmacokinetics,how%20your%20body%20excretes%20it.

- https://www.ashp.org/-/media/store%20files/p2418-sample-chapter-1.pdf
- https://www.ausmed.com/cpd/articles/pharmacokinetics-and-pharmacodynamics
- https://en.wikipedia.org/wiki/Medicine
- https://www.dictionary.com/browse/medicine
- https://www.medicalnewstoday.com/articles/323679#fields-of-medicine

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY

ENZYMOLOGY

CODE: 56030302

M.Sc 3rd SEM

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	8	30	50	70		150

Objectives:-

- The objectives of the paper is students will get about the protein structure, classification of enzymes, terminology, enzyme activity and purification of enzymes and strategy for separation and purification.
- The student will get idea about the enzyme kinetics and mechanism. What is significance of Km, Vmax and Kcat and importance of steady state equilibrium. Enzyme inhibition and its types. Thermal kinetics.
- To provide the mechanism and action of enzyme and its role of activators. Allosteric regulation and its mechanism.
- The study will help in understanding the what are isoenzymes and physiological significance role of different types of enzymes.

Course Outcome:

Unit	Description in Detail	Weightage (In Hours)
1	**Introduction**: Enzymology and historical developments in enzymology Protein Structure: Primary, secondary, tertiary and quaternary structure, techniques used in enzyme characterization Enzyme classification: IUB enzyme classification. Enzyme Activity: Principle and techniques of enzymatic analysis, factors affecting enzyme Activity, Extraction and Purification of enzyme: Objectives and strategy, separation techniques, test of purity.	08
2	**Enzyme Kinetics:** Bioenergetics and Catalysis Single substrate kinetics: Equilibrium and Steady state kinetics, significance of Km, Vmax & Kcat. Pre-steady state and Relaxation kinetics. Multisubstrate kinetics: General rate equation, compulsory order, random order and ping-pong mechanisms and their primary and secondary plots. Enzyme inhibition and its kinetics: Reversible and irreversible inhibition, competitive, noncompetitive and uncompetitive, mixed, partial, substrate and allosteric inhibition. Thermal kinetics: Effect of temperature on reaction rate, enzyme stability, Arrhenius equation and activation energy.	10
3	**Mechanism of Enzyme Action:** Enzyme activators, co-enzymes and co-factors in enzyme catalysis, Enzyme and substrate Specificity Investigation of active Centre, Factors affecting catalytic efficiency, Experimental approaches to determine enzyme mechanisms. Enzyme mechanisms: Lysozyme, Chymotrypsin, Carboxypeptidase, Restriction endonuclease, Aspartate trans carbomylase. Allosteric enzymes and sigmoidal	10

	kinetics: Protein ligand binding, Co-operativity, MWC & KNF models, Regulation of enzyme activity. Control of metabolic pathways.	
4	Isoenzymes and its physiological significance, Ribozymes and Abzymes Enzyme engineering: Chemical modification of enzymes: methods of modification of primary structure, catalytic and allosteric properties, use of group specific reagents. Enzyme Immobilization Enzymes in non conventional media, Enzymes sensors, Enzymes as analytical reagents.	08

Learning Outcomes:

- The students will be able to understand and deals with the biochemical nature and activity of enzymes and is a subject that has relevance to students from a wide range of disciplines.
- Student should be able to understand basic concepts of the present day scope and applications of enzymology.
- The course is designed to give students an understanding of procedures involved in purification of enzymes, enzymes assays and quantitative evaluation of the influencing parameters such as concentrations of substrate / enzyme, pH, temperature and effects of inhibitors on enzyme activity.
- This is a course where the topics to be studied include enzyme active sites / mechanisms of enzyme action; enzyme kinetics and regulation; Isozymes and their clinical significances /function relationship etc as tools for understanding functions of enzymes.

Teaching & Learning Methodology

- We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.
- The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:
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- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Basic Text & Reference Books:

1. *Enzymes: Biochemistry, Biotechnology, Clinical Chemistry 2nd Edition,* authored by Trevor Palmer and Philip Bonner Affiliated East-West Press Pvt. Ltd.
2. Textbook of biochemistry – Vasudevan Shreekumari
3. Biochemistry – Lehninger 6th edition
4. Fundamentals of Enzymologist: Nicholes C. Price and Lewis Stevens, Oxford Univ. Press.
5. Enzyme Structure and mechanism: Alan Fersht, Reading, USA.
6. The chemical kinetics of enzyme action: K. J. Laider and P. S. Bunting, Oxford University Press,London.
7. Enzymes: M. Dixon, E. C.Webb, CJR Thorne and K. F. Tipton, Longmans, London.
8. Biochemistry: Lubert Stryer

E-Resources

- https://www.feedspot.com/infiniterss.php?_src=feed_title&followfeedid=4812449&q=site:https%3A%2F%2Fwww.nature.com%2Fsubjects%2Fbiochemistry.rss
- https://www.sciencedaily.com/news/matter_energy/biochemistry/
- https://thebiochemistblog.com/
- https://www.longdom.org/microbial-biochemical-technology.html
- https://bmcbiochem.biomedcentral.com/
- https://www.slideshare.net/mohdsakharkar/enzyme-final

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY
FOOD & DAIRY MICROBIOLOGY
CODE: 56030303
M.Sc 3rd SEM

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	8	30	50	70		150

Objectives:-

- To provide basic knowledge of food & dairy microbiology.
- In this course the meaning of food microbiology and interaction between microorganism and foods and how food spoilage will be study.
- The pathogenic and non-pathogenic microorganism that found in food and how can they contaminated the foods will be study, in the other hand mycotoxins which is one of the toxin secreted by fungi will be study
- After knowledge of contamination of foods by microorganism the way for preservation of foods from contamination will be study.
- To identify the causative agent in food known as microorganisms
- Understand the mechanism of their reaction in food to make it unsuitable for consumption
- To describe how some microbes proved to be beneficial in the production of food products
- To describe how some bacteria are used in the preservation of food rather than spoil it
- To identify the sources and causes of microbes causing food spoilage

Prerequisites:-

- Student Must have studied B.Sc. with microbiology/biotechnology as a major subject and knowledge of basic biology

Unit	Description in Detail	Weightage (In hours)
1	1. Scope of food microbiology 2. Food as a substrate a) Mircoorganims important in food microbiology- Bacteria, yeast & Moulds b) Factors influencing microbial growth in food.	04
2	1. Food spoilage a) General principles underlying food spoilage and contamination b) Spoilage of canned food, sugar products, vegetables, fruits, meat,milk & milk products, fish, sea food and poultry 2. Food Poisoning a) Indicator food borne pathogens b) Bacterial food borne infections and intoxications- *Clostridum, Escherichia,Salmonella Shigella* c) General methods for diagnosis of infections, intoxication and preventive measures.	06
3	**Food Preservation** **a)** Principles of food preservation-Asepsis, removal of micro organisms, anaerobic conditions, high and low temperature, drying, irriadiation **b)** Chemical and bio preservatives and food additives **c)** Food packaging and labeling.	06
4	Genetically modified foods. Biosensors in food research organizations/institutes in India. Recent food borne outbreaks. Food sanitation-Microbiology of food plant sanitation, water and milk testing food laws and quality control-HACCP, Codex alimentarious, PFA, FPO, MFPO, BIS, AGMARK.	08

Learning Outcomes:

- Describe the characteristics of foodborne, waterborne and spoilage microorganisms, and methods for their isolation, detection and identification.
- Explain why microbiological quality control programme are necessary in food production.
- At the end of the course, the students have acquired skills related to: the microbiological food control through appropriate and targeted applications of physical chemical and biological treatments; the use of basic microbiological methods for the evaluation of the microbial load in the different food matrices; the microbial monitoring of fermented foods; the use of selection scheme for starter cultures.

Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Books Recommended

- Food microbiology, Frazier and Westhoff
- Food microbiology, Adam and Moss
- Dairy Microbiology By Robinson. Volume I and II
- Fundamental food microbiology, Bibek ray and Arun Bhuniya

E-Resources

- https://www.slideshare.net/vasanthanvasu/dairy-microbiology-39885550
- https://www.slideshare.net/HiwrHastear/food-microbiology-60301420
- https://www.biologyexams4u.com/2016/11/12-methods-of-food-preservation.html#.X5v9am4zbcc
- https://www.toppr.com/guides/evs/mangoes-round-the-year/food-spoilage/

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY

MICROBIAL BIOTECHNOLOGY
Subject Code: 56030301
M.Sc. Semester -3

Teaching & Evaluation Scheme

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	6	50	-	50	50	150

Objectives

- To provide students basic knowledge of Microbial Biotechnology. It covers up general concept of microbial production and fermentation of various products.
- The purpose of the course is to give knowledge about production process of primary & secondary metabolites using fermentation technology and microorganisms.
- To provide an understanding of other microbial products such as microbial polysaccharides, beverages, polyhydroxyalkanoates, bio-surfactants and biotransformation of steroids.
- To understand the concepts of biomass production of microorganisms and its applications.

Prerequisites

Student must have studied First year (FY) of M.Sc. with Microbiology as a major subject and knowledge of basic biotechnology.

Course outline

Unit No.	Course Contents	Teaching hours
1	**Microbial production of primary metabolites** • Amino acids: Glutamic acid, Lysine • Enzymes: Proteases, Amylases • Organic acids: Citric acid, Acetic acid • Industrial Alcohol	**10**
2	**Microbial production of secondary metabolites** • Antibiotics: Penicillin, Streptomycin • Vitamins: B_{12}, B_2 • Ergot Alkaloids • Carotenoid pigments: β-carotene, lycopene	**10**
3	**Microbial production of other products & Biotransformation** • Microbial polysaccharides: Xanthan, Alginate and Dextran • Beverages: Beer, Wine • Polyhydroxyalkanoates: PHA and PHB • Biosurfactants • Steroid transformation	**10**
4	**Biomass production and applications** • Fungal biomass- baker's yeast and single cell oil • Mushroom cultivation • Use of Algal biomass. • Microbial production for food and feed	**10**
		40

Learning Outcomes

- The students will be able to apply the knowledge of the Microbial production to understands concepts of various fields like food and dairy industries, pharmaceutical industries, Fermentation industries, beverages industries, etc.

- Student should be able to understand basic concepts of various products like amino acids, enzymes, vitamins, organic acids, industrial alcohol, beer, wine, microbial polysaccharides, Biosurfactants as well as biotransformation of steroids. Students also apply knowledge of mushroom cultivation, fungal biomass production, algal biomass and other microbial production for food and feed.

- Access information on a topic from a variety of sources, and be able to learn new things on one's own.

- Communicate verbally, graphically, and/or in writing the theoretical data clearly and concisely that incorporates the stylistic conventions used by Microbiologists, biotechnologist, researchers and scientists worldwide.

Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc.) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Books Recommended

1. A.N. Glazer and H. Nikaido. (2007) *Microbial Biotechnology. Fundamentals of Applied Microbiology.* (2nd edition)
2. E. M. T. El-Mansi, E. M. T. El-Mansi, C. F. A. Bryce, Arnold L. Demain, A.R. Allman (2006) *Fermentation Microbiology and Biotechnology* (2nd edition)
3. James.M. Jay, Martin J. Loessner, David. A. Golden (2005). *Modern Food Microbiology* 7th Edition (Food Science Texts Series)
4. Michael J. Waites, Neil L. Morgan, John S. Rockey, Gary Higton (2001). *Industrial Microbiology: An Introduction*

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY
ENVIRONMENTAL MICROBIOLOGY
CODE: 56030401
M.Sc. 4th SEM

Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	8	30	50	70		150

Objectives:-

- To provide basic knowledge of Environmental Microbiology. It covers up scope of global warming, environmental problems, biodegradation, bioleaching.
- To provide basic knowledge of microbes in environment.
- The main goal is to know and understand the role of microbes in biogeochemical processes in different ecosystems. The students will learn the basic microbiological principles, the methods in microbial ecology and their theoretical and practical use.
- The knowledge can give the base for understanding processes and changes in the environment.
- The students can get some skills to recognise the ecological problems and critical evaluation of the human impacts on pollution, climate changes and as well as environmental protection.
- The lectures will be implemented with individual practical work in the laboratory and presentations of the seminars.
- The students can get general competences in microbial ecology.

Prerequisites:-

- Student Must have studied B.Sc. with microbiology/biotechnology as a major subject and knowledge of basic biology

Course outline:-

Unit	Description in Detail	Weightage
1	Global environmental problems: Global warming, Ozone depletion, Acid rain. Global warming and infectious diseases. Water pollution: sources and types, physical, chemical and biological pollution. Eutrophication and its control Microbial indicators of water pollution Biodeterioration of wood and metals. Role of microorganism, mechanism and control.	10
2	Bioremediation: Intrinsic bioremediation, Biostimulation and Bioaugmentation. In situ and ex situ bioremediation echnologies. Bioremediation of oil spills. Bioremediation of heavy metal pollution, Phytoremediation. Use of GMO in bioremediation. Biological treatment of waste gas (polluted air): biofilters, bioscrubbers, membrane bioreactors, biotrickling filters.	10
3	Biodegradation of organic pollutants: Mechanisms and factors affecting biodegradation. Pollution problems and biodegradation of simple aliphatic, aromatic, polycyclic aromatic hydrocarbons, halogenated hydrocarbons, azo dyes, lignin and pesticides.	10
4	Bioleaching of metals: Characteristics of commercially important microbes, mechanisms of bioleaching, factors affecting bioleaching and current biomining processes. Biobeneficiation of gold ores. Microbially enhanced oil recovery. Biodesulfurization of coal: Removal of organic and inorganic sulphur from coal. Microbial Insecticides: Bacterial, fungal and viral	10

	insecticides in pest management. Biofertilizers: Nitrogen fixing and phosphate solubilizing biofertilizers.	
		40

Learning Outcomes:

- At the end of the course the student would have basic knowledge of microbiology techniques and bacteria.
- Students will get the basic knowledge how to prepare and perform sampling and microbial analyses to determine the abundance, growth rate and microbial community composition together with the basic environmental parameters.
- The knowledge can be used to prevent infections and to protect human and environmental health.
- Students will get basic knowledge to determine the role of microbes:

- in different habitates,

- in different biogeochemical cycles,

- to determine their role in nutrient cycling

- to determine water quality,

- in degradation of natural organic compounds and selected pollutants in the environment.

Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module

or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Books Recommended

- . Environmental Microbiology –RM Maier, IL Pepper & GP Gerba
- Comprehensive Biotechnology- Vol 4, Murray Moo Young
- Biotechnology – Rehm and Reid
- Environmental Science 0 BJ Nebel and RT Wright
- Environmental Biotechnology –HJ Jordening & Josef Winter

SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARRNIM SCIENCE COLLEGE

DEPARTMENT OF MICROBIOLOGY

r-DNA Technology
Subject Code: 56030402
M.SC. Semester -4

Teaching & Evaluation Scheme

Teaching Scheme				Credits	Evaluation Scheme				
					Internal		External		Total
Th	Tu	P	Total		Th	Pr	Th	Pr	
4	-	2	6	8	30	50	70	-	150

Objectives

- To provide students the basic knowledge of R-DNA technology (Recombinant DNA technology).
- The purpose of the course is to give student to introduction of Recombinant DNA technology and its cover up scope of genetic engineering, Cloning, Recombinant, and PCR.
- To provide an understanding of Scope of genetic engineering, concept & important of genetic engineering, chemical synthesis of gene cloning & expression vectors, and PCR techniques.

Prerequisites

Student must have studied M.Sc. with microbiology as a major subject and knowledge of basic microbiology/Life science.

Course outline

Sr. No.	Course Contents	Teaching hours
1.	Scope of Genetic Engineering, Concept and importance of Genetic Engineering; General strategies and Steps involved in gene cloning; Extraction and purification of DNA from bacteria, plant and animal cells; Restriction enzymes, DNA lipase and other enzymes involved in gene cloning; mRNA and cDNA preparation.	06
2.	Chemical synthesis of gene/DNA Cloning and expression vectors- Plasmids, _-bacteriophages, M-13 based vectors, Phagemids, Cosmids, YAC, BAC,HAC/MAC, etc. Expression of cloned gene in heterologous host Introduction of DNA into different host systems.	06
3.	Recombinant selection and screening Southern blotting & hybridization, Northern analysis, Western blot analysis, Agarose gel electrophoresis, Pulse Field Gel Electrophoresis, Rotating Gel. Electrophoresis (RGE), Mapping Regulatory Sequences by in vivo expression assay Mapping of Protein Binding Site by DNAse I Protection, Mobility Gel Shift Assay Protein Activity Assay – Yeast-one hybrid, Yeast-two hybrid and Yeast-three hybrid system. Phage display, Subtractive hybridization and cloning, HRT/HART, Chromosomal Walk. Characterization of Cloned genes .Restriction map,S1 mapping ,Denaturation mapping ,Heterogonous mapping DNA sequencing, Nucleic Acid Microarray, Metagenomics, Metabolism, gene therapy.	10
4	Polymerase chain reaction Molecular markers Linkage mapping using meiotic recombination frequencies Genomic mapping using radiation induced Chromosome rearrangement Genomic mapping using DNA sequence polymorphism as genetic marker In vitro Mutagenesis Metagenomics Metabolic engineering Gene therapy Recombinant products- recombinant hormones ,recombinant DNA vaccines, Transgenic plants, Transgenic animals, Genetic Engineering Guidelines, Levels of Physical containment, Levels of Biological Containment, The Indian Guidelines.	10

Learning Outcomes

- The students will be able to understand the Knowledge of r-DNA technology to understand concept of various fields like research, gene manipulation, genetic engineering, gene cloning, fermentation industries, etc.

- Student should be able to understand basic concepts of recombination, methods of genetic engineering, screening methods, enzymes involved in r-DNA technology, DNA sequencing, vectors, gene markers, transgenic plants and animals as well as gene therapy.

- Access information on a topic from a variety of sources, and be able to learn new things on one's own.

- Communicate verbally, graphically and/or in writing the theoretical data clearly and concisely that incorporates the stylistic conventions used by microbiologists, biotechnologists, researchers and scientist worldwide.

Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

Books Recommended

1. Genomes TA Brown 3rd Edition
2. Principles of Genetic Manipulation- Old & Primrose
3. Genetic Engineering – Rastogi & Pathak
4. .Recombinant DNA technology by keya chaudhari

E-Resources

- https://www.slideshare.net/mobile/SECBIO/genetic-engineering-13933607
- https://www.slideshare.net/mobile/ImdadTakkar/artificial-gene-synthesis
- https://www.slideshare.net/mobile/FarazaJaved/pcr-76618045
- https://www.slideshare.net/mobile/fizz92fizzuo/vectors-49902617

1.2 Marks: Paper I-100; Paper II-100

1.3 Contents:

1.3.1 Paper-I: Gynaecology and homoeopathic therapeutics

1.3.2. Paper-II: Obstetrics, infant care and homoeopathic therapeutics

2. Practical including viva voce or oral:

2.1. Marks: 200

2.2. Distribution of marks;

	Marks
2.2.1. One long case	30
2.2.2. Practical records, case records, journal	30
2.2.3. Identification of instruments, models and specimens	40
2.2.4. Viva voce (oral)	100
Total	200

COMMUNITY MEDICINE

Instructions:

I. (a) Physician's function is not limited merely prescribing homoeopathic medicines for curative purpose, but he has wider role to play in the community;

(b) He has to be well conversant with the national health problems of rural as well as urban areas, so that he can be assigned responsibilities to play an effective role not only in the field of curative but also preventive and social medicine including family planning.

II. This subject is of utmost importance and throughout the period of study attention of the student should be directed towards the importance of preventive medicine and the measures for the promotion of positive health.

III. (a) During teaching, focus should be laid on community medicine concept, man and society, aim and scope of preventive and social medicine, social causes of disease and social problems of the sick, relation of economic factors and environment in health and disease;

(b) Instructions in this course shall be given by lectures, practicals, seminars, group discussions, demonstration and field studies.

Third B.H.M.S

A. Theory:

1. Man and Medicine
2. Concept of health and disease in conventional medicine and homoeopathy
3. Nutrition and health
   - (a) Food and nutrition
   - (b) Food in relation to health and disease
   - (c) Balanced diet
   - (d) Nutritional deficiencies, and Nutritional survey
   - (e) Food Processing
   - (f) Pasteurisation of milk
   - (g) Adulteration of food
   - (h) Food Poisoning
4. Environment and health
   - (a) air, light and sunshine, radiation.

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1.2 Marks: Paper I-100; Paper II-100

1.3 Contents:

1.3.1 Paper-I: Gynaecology and homoeopathic therapeutics

1.3.2. Paper-II: Obstetrics, infant care and homoeopathic therapeutics

2. Practical including viva voce or oral:

2.1. Marks: 200

2.2. Distribution of marks;	Marks
2.2.1. One long case	30
2.2.2. Practical records, case records, journal	30
2.2.3. Identification of instruments, models and specimens	40
2.2.4. Viva voce (oral)	100
Total	200

COMMUNITY MEDICINE

Instructions:

I. (a) Physician's function is not limited merely prescribing homoeopathic medicines for curative purpose, but he has wider role to play in the community;

(b) He has to be well conversant with the national health problems of rural as well as urban areas, so that he can be assigned responsibilities to play an effective role not only in the field of curative but also preventive and social medicine including family planning.

II. This subject is of utmost importance and throughout the period of study attention of the student should be directed towards the importance of preventive medicine and the measures for the promotion of positive health.

III. (a) During teaching, focus should be laid on community medicine concept, man and society, aim and scope of preventive and social medicine, social causes of disease and social problems of the sick, relation of economic factors and environment in health and disease;

(b) Instructions in this course shall be given by lectures, practicals, seminars, group discussions, demonstration and field studies.

Third B.H.M.S

A. Theory:

1. Man and Medicine

2. Concept of health and disease in conventional medicine and homoeopathy

3. Nutrition and health

(a) Food and nutrition

(b) Food in relation to health and disease

(c) Balanced diet

(d) Nutritional deficiencies, and Nutritional survey

(e) Food Processing

(f) Pasteurisation of milk

(g) Adulteration of food

(h) Food Poisoning

4. Environment and health

(a) air, light and sunshine, radiation.

(b) effect of climate

(c) comfort zone

(d) personal hygiene

(e) physical exercise

(f) sanitation of fair and festivals

(g) disinfection and sterilisation

(h) atmospheric pollution and purification of air

(i) air borne diseases

5. Water

(a) distribution of water; uses; impurities and purification

(b) standards of drinking water

(c) water borne diseases

(d) excreta disposal

(e) disposal of deceased.

(f) disposal of refuse.

(g) medical entomology- insecticides, disinfection, Insects in relation to disease, Insect control.

6. Occupational health

7. Preventive medicine in pediatrics and geriatrics

Fourth B.H.M.S

A. Theory:

1. Epidemiology

(a) Principles and methods of epidemiology

(b) Epidemiology of communicable diseases:

- General principles of prevention and control of communicable diseases;

(c) Communicable diseases: their description, mode of spread and method of prevention.

(d) Protozoan and helminthic infections- Life cycle of protozoa and helminthes, their prevention.

(e) Epidemiology of non-communicable diseases: general principles of prevention and control of non-communicable diseases

(f) Screening of diseases

2. Bio-statistics

(a) Need of biostatistics in medicine

(b) Elementary statistical methods

(c) Sample size calculation

(d) Sampling methods

(e) Test of significance

(f) Presentation of data

(g) Vital statistics

3. Demography and Family Planning; Population control; contraceptive practices; National Family Planning Programme.

4. Health education and health communication

5. Health care of community.

6. International Health

27. Euphrasia
28. Ferrum phosphoricum
29. Gelsemium
30. Hepar sulph
31. Hypericum perforatum
32. Ipecacuanha
33. Kali muriaticum
34. Kali phosphoricum
35. Kali sulphuricum
36. Ledum palustre
37. Lycopodium clavatum
38. Magnesium phosphoricum
39. Natrum muriaticum
40. Natrum phosphoricum
41. Natrum sulphuricum
42. Nux vomica
43. Pulsatilla
44. Rhus toxicodendron
45. Ruta graveolens
46. Silicea
47. Spongia tosta
48. Sulphur
49. Symphytum officinale
50. Thuja occidentalis

B:. Practical or clinical:

This will cover,-

(i) case taking of acute and chronic patients.

(ii) case processing including totality of symptoms, selection of medicine, potency and repetition Schedule

Each student shall maintain practical record or journal with record of five cases.

C. Examination:

The syllabus covered in First BHMS and Second BHMS course are the following, namely:-

1. Theory:

1.1. Number of papers-01

1.2. Marks: 100

1.3. Distribution of marks:

1.3.1. Topics of I B.H.M.S. 50 Marks

1.3.2. Topics of II B.H.M.S. 50 Marks

2. Practical including viva voce or oral:

2.1. Marks:100

2.2. Distribution of marks;	Marks
2.2.1. Case taking and Case processing of one long case	30
2.2.2. Case taking of one short Case	10
2.2.3.Maintenance of Practical record or journal	10
2.2.4. Viva voce (oral)	50
Total	100

THIRD B.H.M.S

In addition to the syllabus of First and Second B.H.M.S. including the use of medicines for Second BHMS (Appendix-I), the following additional topics and medicines are included in the syllabus of homoeopathic materia medica for the Third B.H.M.S examination.

A. General Topics of Homoeopathic Materia Medica –

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Arihant Homoeopathic Medical College & R.I. Institute Bhoyan Rathod.

27. Euphrasia
28. Ferrum phosphoricum
29. Gelsemium
30. Hepar sulph
31. Hypericum perforatum
32. Ipecacuanha
33. Kali muriaticum
34. Kali phosphoricum
35. Kali sulphuricum
36. Ledum palustre
37. Lycopodium clavatum
38. Magnesium phosphoricum
39. Natrum muriaticum
40. Natrum phosphoricum
41. Natrum sulphuricum
42. Nux vomica
43. Pulsatilla
44. Rhus toxicodendron
45. Ruta graveolens
46. Silicea
47. Spongia tosta
48. Sulphur
49. Symphytum officinale
50. Thuja occidentalis

B:. Practical or clinical:

This will cover,-

(i) case taking of acute and chronic patients.

(ii) case processing including totality of symptoms, selection of medicine, potency and repetition Schedule

Each student shall maintain practical record or journal with record of five cases.

C. Examination:

The syllabus covered in First BHMS and Second BHMS course are the following, namely:-

1. Theory:

1.1. Number of papers-01

1.2. Marks: 100

1.3. Distribution of marks:

1.3.1. Topics of I B.H.M.S. 50 Marks

1.3.2. Topics of II B.H.M.S. 50 Marks

2. Practical including viva voce or oral:

2.1. Marks:100

2.2. Distribution of marks;	Marks
2.2.1. Case taking and Case processing of one long case	30
2.2.2. Case taking of one short Case	10
2.2.3.Maintenance of Practical record or journal	10
2.2.4. Viva voce (oral)	50
Total	100

THIRD B.H.M.S

In addition to the syllabus of First and Second B.H.M.S. including the use of medicines for Second BHMS (Appendix-I), the following additional topics and medicines are included in the syllabus of homoeopathic materia medica for the Third B.H.M.S examination.

A. General Topics of Homoeopathic Materia Medica –

In addition to the syllabus of First and Second B.H.M.S. including the use of medicines for Second BHMS (Appendix-I), the following additional topics and medicines are included in the syllabus of Homoeopathic Materia Medica for the Third B.H.M.S. Examination.

(a) concept of nosodes - definition of nosodes, types of nosodes, general indications of dosodes.

(b) concepts of constitution, temperaments, diathesis-

definitions, various concepts of constitution with their peculiar characteristics, importance of constitution, temperaments and diathesis and their utility in treatment of patients.

B. Concept of mother tincture.

C. Homoeopathic medicines to be taught in Third B.H.M.S. as in Appendix-II

APPENDIX-II

1.	Acetic acid
2.	Actea spicata
3.	Agaricus muscarius
4.	Agnus castus
5.	Alumina
6.	Ambra grisea
7.	Ammonium carbonicum
8.	Ammonium muriaticum
9.	Anacardium orientale
10.	Apocynum cannabinum
11.	Arsenicum Iodatum
12.	Asafoetida
13.	Aurum metallicum
14.	Baryta carbonica
15.	Belladonna
16.	Benzoic acid
17.	Berberis vulgaris
18.	Bismuth
19.	Borax
20.	Bovista Iycoperdon
21.	Bromium
22.	Bufo rana
23.	Cactus grandiflorus
24.	Caladium seguinum
25.	Calcarea arsenicosa
26.	Camphora
27.	Cannabis indica
28.	Cannabis sativa
29.	Cantharis vesicatoria
30.	Carbo vegetabilis
31.	Chelidonium majus

32.	Conium maculatum
33.	Crotalus horridus
34.	Croton tiglium
35.	Cyclamen europaeum
36.	Digitalis purpurea
37.	Dioscorea villosa
38.	Equisetum hyemale
39.	Ferrum metallicum
40.	Graphites
41.	Helleborus niger
42.	Hyoscyamus niger
43.	Ignatia amara
44.	Kali bichromicum
45.	Kali bromatum
46.	Kali carbonicum
47.	Kreosotum
48.	Lachesis muta
49.	Moschus
50.	Murex purpurea
51.	Muriatic acid
52.	Naja tripudians
53.	Natrum carbonicum
54.	Nitric acid
55.	Nux moschata
56.	Opium
57.	Oxalic acid
58.	Petroleum
59.	Phosphoric acid
60.	Phosphorus
61.	Phytolacca decandra
62.	Picric acid

63.	Platinum metallicum
64.	Podophyllum
65.	Secale cornutum
66.	Selenium
67.	Sepia
68.	Staphysagria
69.	Stramonium
70.	Sulphuric acid

71.	Syphilinum
72.	Tabacum
73.	Taraxacum officinale
74.	Tarentula cubensis
75.	Terebinthina
76.	Theridion
77.	Thlaspi bursa pastoris
78.	Veratrum album

Group studies
Acid group
Carbon group
Kali group
Ophidia group
Mercurius group
Spider group

D. Practical or clinical:

(1) This will cover,–

(a) case taking of acute and chronic patients.

(b) case processing including selection of medicine, potency and repetition schedule

(2) Each student shall maintain a journal having record of ten case takings.

E. Examination:

1. Theory:

1. 1. Number of papers- 01

1. 2. Marks: 100

1. 3. Distribution of marks:

1.3.1. Topics of Second B.H.M.S. 50 Marks

1.3.2. Topics of Third B.H.M.S. 50 Marks

2. Practical including viva voce or oral:

2.1. Marks:100

2.2. Distribution of marks:

	Marks
2.2.1. Case taking and case processing of one long case	30
2.2.2. Case taking of one short case	10
2.2.3.Maintenance of practical record or journal	10
2.2.4. Viva voce or oral	50
Total	100

Fourth B.H.M.S

In addition to the syllabus of First, Second and Third BHMS including the medicines taught as per the Appendices I and II, the following additional topics and medicines are included in the syllabus for the Fourth BHMS examination.

Total 100

GYNAECOLOGY AND OBSTETRICS

Instructions:

I. (a) Homoeopathy adopt the same attitude towards this subject as it does towards Medicine and Surgery, but while dealing with Gynaecology and Obstetrical cases, a Homoeopathic physician must be trained in special clinical methods of investigation for diagnosing local conditions and individualising cases, the surgical intervention either as a life saving measure or for removing mechanical obstacles, if necessary, as well as their management by using homoeopathic medicines and other auxiliary methods of treatment;

(b) Pregnancy is the best time to eradicate genetic dyscrasias in women and this should be specially stressed. And students shall also be instructed in the care of new born;

(c) The fact that the mother and child form a single biological unit and that this peculiar close physiological relationship persists for at least the first two years of the child's life should be particularly emphasised.

II. A course of instructions in the principles and practice of gynaecology and obstetrics and infant hygiene and care including the applied anatomy and physiology of pregnancy and labour, will be given.

III. Examinations and investigations in gynaecological and obstetrical cases shall be stressed and scope of homoeopathy in this subject shall be taught in details.

IV. The study shall start in Second B.H.M.S and shall be completed in Third B.H.M.S. and examinations will be held in Third B.H.M.S and following topics shall be taught, namely:-

Second B.H.M.S

A. Theory:

1. Gynaecology

(a) A review of the applied anatomy of female reproductive systems-development and malformations.

(b) A review of the applied physiology of female reproductive systems-puberty, menstruation and menopause.

(c) Gynaecological examination and diagnosis.

(d) Developmental anomalies.

(e) Uterine displacements.

(f) Sex and intersexuality.

(g) General Management and therapeutics of the above listed topics in Gynaecology .

2. Obstetrics

(a) Fundamentals of reproduction.

(b) Development of the intrauterine pregnancy-placenta and foetus.

(c) Diagnosis of pregnancy-investigations and examination.

(d) Antenatal care.

(e) Vomiting in pregnancy.

(f) Preterm labour and post maturity.

(g) Normal labour and puerperium.

(h) Induction of labour.

(i) Postnatal and puerperal care.

(j) Care of the new born.

(k) Management and therapeutics of the above listed topics in obstetrics.

Third B.H.M.S

1. Gynaecology

(a) Infections and ulcerations of the female genital organs.

(b) Injuries of the genital tract.

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Total 100

GYNAECOLOGY AND OBSTETRICS

Instructions:

I. (a) Homoeopathy adopt the same attitude towards this subject as it does towards Medicine and Surgery, but while dealing with Gynaecology and Obstetrical cases, a Homoeopathic physician must be trained in special clinical methods of investigation for diagnosing local conditions and individualising cases, the surgical intervention either as a life saving measure or for removing mechanical obstacles, if necessary, as well as their management by using homoeopathic medicines and other auxiliary methods of treatment;

(b) Pregnancy is the best time to eradicate genetic dyscrasias in women and this should be specially stressed. And students shall also be instructed in the care of new born;

(c) The fact that the mother and child form a single biological unit and that this peculiar close physiological relationship persists for at least the first two years of the child's life should be particularly emphasised.

II. A course of instructions in the principles and practice of gynaecology and obstetrics and infant hygiene and care including the applied anatomy and physiology of pregnancy and labour, will be given.

III. Examinations and investigations in gynaecological and obstetrical cases shall be stressed and scope of homoeopathy in this subject shall be taught in details.

IV. The study shall start in Second B.H.M.S and shall be completed in Third B.H.M.S. and examinations will be held in Third B.H.M.S and following topics shall be taught, namely:-

Second B.H.M.S

A. Theory:

1. Gynaecology

(a) A review of the applied anatomy of female reproductive systems-development and malformations.

(b) A review of the applied physiology of female reproductive systems-puberty, menstruation and menopause.

(c) Gynaecological examination and diagnosis.

(d) Developmental anomalies.

(e) Uterine displacements.

(f) Sex and intersexuality.

(g) General Management and therapeutics of the above listed topics in Gynaecology .

2. Obstetrics

(a) Fundamentals of reproduction.

(b) Development of the intrauterine pregnancy-placenta and foetus.

(c) Diagnosis of pregnancy-investigations and examination.

(d) Antenatal care.

(e) Vomiting in pregnancy.

(f) Preterm labour and post maturity.

(g) Normal labour and puerperium.

(h) Induction of labour.

(i) Postnatal and puerperal care.

(j) Care of the new born.

(k) Management and therapeutics of the above listed topics in obstetrics.

Third B.H.M.S

1. Gynaecology

(a) Infections and ulcerations of the female genital organs.

(b) Injuries of the genital tract.

(c) Disorders of menstruation.

(d) Menorrhagia and dysfunctional uterine bleeding.

(e) Disorders of female genital tract.

(f) Diseases of breasts.

(g) Sexually transmitted diseases.

(h) Endometriosis and adenomyosis.

(i) Infertility and sterility.

(j) Non-malignant growths.

(k) Malignancy.

(l) Chemotherapy caused complications.

(m) Management and therapeutics of the above listed topics in gynaecology.

2. Obstetrics

(a) High risk labour; mal-positions and mal-presentations; twins, prolapse of cord and limbs, abnormalities in the action of the uterus; abnormal conditions of soft part contracted pelvis; obstructed labour, complications of 3rd stage of labour, injuries of birth canal, foetal anomalies.

(b) Abnormal pregnancies-abortions, molar pregnancy, diseases of placenta and membranes, toxemia of pregnancy, antepartum haemorrhages, multiple pregnancy, proctracted gestation, ectopic pregnancy, intrauterine growth retardation, pregnancy in Rh negative woman, intrauterine fetal death, still birth.

(c) Common disorders and systemic diseases associated with pregnancy.

(d) Pre-natal Diagnostic Techniques (Regulation and Prevention of Misuse) Act, 1994.

(e) Common obstetrical operations-medical termination of pregnancy, criminal abortion, caesarean section, episiotomy.

(f) Emergency obstetric care.

(g) Population dynamics and control of conception.

(h) Infant care – neonatal hygiene, breast feeding, artificial feeding, management of premature child, asphyxia, birth injuries, common disorders of newborn.

(i) Reproductive and child health care (a) safe motherhood and child survival (b) Risk approach –MCH care (c) Maternal mortality and morbidity (d) Perinatal mortality and morbidity (e) Diseases of foetus and new born.

(j) Medico-legal aspects in obstetrics.

(k) Homoeopathic Management and Therapeutics of the above listed clinical conditions in Obstetrics.

B. Practical or clinical:

Practical or clinical classes shall be taken on the following topics both in Second and Third B.H.M.S.

(a) Gynaecological case taking

(b) Obstetrical case taking

(c) Gynaecological examination of the patient

(d) Obstetrical examination of the patient including antenatal, intranatal and post- natal care

(e) Bed side training

(f) Adequate grasp over Homoeopathic principles and management

(g) Identification of Instruments and models

Record of ten cases each in gynaecology and obstetrics.

C. Examination:

1. Theory:

1.1 Number of papers - 02

1.2 Marks: Paper I-100; Paper II-100

1.3 Contents:

1.3.1 Paper-I: Gynaecology and homoeopathic therapeutics

1.3.2. Paper-II: Obstetrics, infant care and homoeopathic therapeutics

2. Practical including viva voce or oral:

2.1. Marks: 200

2.2. Distribution of marks;	Marks
2.2.1. One long case	30
2.2.2. Practical records, case records, journal	30
2.2.3. Identification of instruments, models and specimens	40
2.2.4. Viva voce (oral)	100
Total	200

COMMUNITY MEDICINE

Instructions:

I. (a) Physician's function is not limited merely prescribing homoeopathic medicines for curative purpose, but he has wider role to play in the community;

(b) He has to be well conversant with the national health problems of rural as well as urban areas, so that he can be assigned responsibilities to play an effective role not only in the field of curative but also preventive and social medicine including family planning.

II. This subject is of utmost importance and throughout the period of study attention of the student should be directed towards the importance of preventive medicine and the measures for the promotion of positive health.

III. (a) During teaching, focus should be laid on community medicine concept, man and society, aim and scope of preventive and social medicine, social causes of disease and social problems of the sick, relation of economic factors and environment in health and disease;

(b) Instructions in this course shall be given by lectures, practicals, seminars, group discussions, demonstration and field studies.

Third B.H.M.S

A. Theory:

1. Man and Medicine

2. Concept of health and disease in conventional medicine and homoeopathy

3. Nutrition and health

(a) Food and nutrition

(b) Food in relation to health and disease

(c) Balanced diet

(d) Nutritional deficiencies, and Nutritional survey

(e) Food Processing

(f) Pasteurisation of milk

(g) Adulteration of food

(h) Food Poisoning

4. Environment and health

(a) air, light and sunshine, radiation.

2.4. Case taking:

The purpose of homoeopathic case taking is not merely collection of the disease symptoms from the patient, but comprehending the patient as a whole with the correct appreciation of the factors responsible for the genesis and maintenance of illness. Hahnemann's concept and method of case taking, as stated in his Organon of Medicine is to be stressed upon.

2.5. Case processing: This includes,

(i) Analysis of Symptoms,

(ii) Evaluation of Symptoms,

(iii) Miasmatic diagnosis,

(iv) Totality of symptoms

B. Parctical or clinical:

1. Clinical posting of students shall be started from Second B.H.M.S onwards.
2. Each student shall maintain case records of at least ten acute cases

C. Examination:

1. Theory

1.1. No. of papers -01

1.2. Marks: 100

1.3. Distribution of marks:

1.3.1. Logic – 15 marks

1.3.2. Psychology – 15 marks

1.3.3. Fundamentals of homoeopathy and aphorisms 1 to 104 – 50 marks

1.3.4. Homoeopathic philosophy – 20 marks

2. Practical including viva voce or oral:

2.1. Marks: 100

2.2. Distribution of marks:

		Marks
2.2.1. Case taking and Case processing	40	
2.2.2. Maintenance of practical record or journal		10
2.2.4. Viva voce (oral)		50
Total		100

THIRD B.H.M.S.

A. Theory:

In addition to revision of Aphorisms studied in First B.H.M.S and Second B.H.M.S, the following shall be covered, namely:–

1. Hahnemann's Prefaces and Introduction to Organon of Medicine.
2. Aphorisms 105 to 294 of Hahnemann's Organon of Medicine, including foot notes (5th and 6th Editions translated by R.E. Dudgeon and W. Boericke)
3. Chapters of Philosophy books of J.T. Kent (Chapters- 28, 29, 30, 34 to 37), Stuart Close (Chapters- 7, 10, 13, 14, 15) & H.A. Roberts (Chapters- 7, 10, 12 to 19,21, 34) related to 105-294 Aphorisms of Organon of Medicine.

Principal

2.4. Case taking:

The purpose of homoeopathic case taking is not merely collection of the disease symptoms from the patient, but comprehending the patient as a whole with the correct appreciation of the factors responsible for the genesis and maintenance of illness. Hahnemann's concept and method of case taking, as stated in his Organon of Medicine is to be stressed upon.

2.5. Case processing: This includes,

(i) Analysis of Symptoms,

(ii) Evaluation of Symptoms,

(iii) Miasmatic diagnosis,

(iv) Totality of symptoms

B. Parctical or clinical:

1. Clinical posting of students shall be started from Second B.H.M.S onwards.

2. Each student shall maintain case records of at least ten acute cases

C. Examination:

1. Theory

1.1. No. of papers -01

1.2. Marks: 100

1.3. Distribution of marks:

1.3.1. Logic – 15 marks

1.3.2. Psychology – 15 marks

1.3.3. Fundamentals of homoeopathy and aphorisms 1 to 104 – 50 marks

1.3.4. Homoeopathic philosophy – 20 marks

2. Practical including viva voce or oral:

2.1. Marks: 100

2.2. Distribution of marks:		Marks
2.2.1. Case taking and Case processing	40	
2.2.2. Maintenance of practical record or journal		10
2.2.4. Viva voce (oral)		50

Total		100

THIRD B.H.M.S.

A. Theory:

In addition to revision of Aphorisms studied in First B.H.M.S and Second B.H.M.S, the following shall be covered, namely:–

1. Hahnemann's Prefaces and Introduction to Organon of Medicine.

2. Aphorisms 105 to 294 of Hahnemann's Organon of Medicine, including foot notes (5th and 6th Editions translated by R.E. Dudgeon and W. Boericke)

3. Chapters of Philosophy books of J.T. Kent (Chapters- 28, 29, 30, 34 to 37), Stuart Close (Chapters- 7, 10, 13, 14, 15) & H.A. Roberts (Chapters- 7, 10, 12 to 19,21, 34) related to 105-294 Aphorisms of Organon of Medicine.

B. Practical or clinical:

Each student appearing for Third B.H.M.S examination shall maintain records of 20 cases (10 acute and 10 chronic cases).

C. Examination:

1. Theory:

1.1. Number of papers - 01

1.2. Marks: 100

1.3. Distribution of Marks:

1.3.1. Aphorisms 1 to 294 : 60 marks

1.3.2. Homoeopathic philosophy: 40 marks

2. Practical including viva voce or oral:

2.1. Marks: 100

2.2. Distribution of marks;

	Marks
2.2.1. Case taking and case processing	40
2.2.3. Maintenance of practical record or journal	10
2.2.4. Viva voce (oral)	50
Total	100

FOURTH B.H.M.S.

A. Theory:

In addition to the syllabus of First B.H.M.S, Second B.H.M.S and Third B.H.M.S, the following shall be covered, namely:–

1. Evolution of medical practice of the ancients (Prehistoric Medicine, Greek Medicine, Chinese medicine, Hindu medicine and Renaissance) and tracing the empirical, rationalistic and vitalistic thoughts.

2. Revision of Hahnemann's Organon of Medicine (Aphorisms 1-294) including footnotes (5th & 6th Editions translated by R.E. Dudgeon and W. Boericke).

3. Homoeopathic Philosophy:

Philosophy books of Stuart Close (Chapters- 1, 2, 4, 5, 6, 8, 17), J.T. Kent (Chapters - 18 to 22) and H.A. Roberts (Chapters- 1 to 5, 20, 22 to 33, 35), Richard Hughes (Chapters- 1 to 10) and C. Dunham (Chapters- 1 to 7).

4. Chronic Diseases:

4.1. Hahnemann's Theory of Chronic Diseases.

4.2. J.H. Allen's The Chronic Miasms – Psora and Pseudo-psora; Sycosis

(a) Emphasis should be given on the way in which each miasmatic state evolves and the characteristic expressions are manifested at various levels and attempt should be made to impart a clear understanding of Hahnemann's theory of chronic miasms.

(b) The characteristics of the miasms need to be explained in the light of knowledge acquired from different branches of medicine.

(c) Teacher should explain clearly therapeutic implications of theory of chronic miasms in practice and this will entail a comprehension of evolution of natural disease from miasmatic angle, and it shall be correlated with applied materia medica.

B. Practical or clinical:

(a) The students shall maintain practical records of patients treated in the out patient department and inpatient department of the attached hospital.

(i) ENT	-10 marks
(ii) Ophthalmology	-10 marks
(iii) Dentistry	-05 marks
Section– 2: -Systemic Surgery	
Homoeopathic Therapeutics	25 marks
(i) ENT Homoeopathic Therapeutics	-10 marks
(ii) Ophthalmology Homoeopathic Therapeutics	-10 marks
(iii) Dentistry Homoeopathic Therapeutics	-05 marks

2. Practical including viva voce or oral:

2.1. Marks: 200

2.2. Distribution of marks;	Marks
2.2.1. One long case	40
2.2.2. Identification of instruments, X-rays	30
2.2.3. Practical records, case records or journal	30
2.2.4. Viva voce (oral)	100
Total	200

PRACTICE OF MEDICINE

Instructions:

I (a) Homoeopathy has a distinct approach to the concept of disease;

(b) it recognises an ailing individual by studying him as a whole rather than in terms of sick parts and emphasizes the study of the man, his state of health, state of Illness.

II The study of the above concept of individualisation is essential with the a following background so that the striking features which are characteristic to the individual become clear, in contrast to the common picture of the respective disease conditions, namely:–

(1) correlation of the disease conditions with basics of anatomy, physiology and, biochemistry and pathology.

(2) knowledge of causation, manifestations, diagnosis (including differential diagnosis), prognosis and management of diseases.

(3) application of knowledge of organon of medicine and homoeopathic philosophy in dealing with the disease conditions.

(4) comprehension of applied part.

(5) sound clinical training at bedside to be able to apply the knowledge and clinical skill accurately.

(6) adequate knowledge to ensure that rational investigations are utilised.

III (a) The emphasis shall be on study of man in respect of health, disposition, diathesis, disease, taking all predisposing and precipitating factors, i.e. fundamental cause, maintaining cause and exciting cause;

(b) Hahnemann's theory of chronic miasms provides us an evolutionary understanding of the chronic diseases: psora, sycosis, syphilis and acute manifestations of chronic diseases and evolution of the natural disease shall be comprehended in the light of theory of chronic miasms.

IV (a) The teaching shall include homoeopathic therapeutics or management in respect of all topics and clinical methods of examination of patient as a whole will be given due stress during the training;

(b) A thorough study of the above areas will enable a homoeopathic physician to comprehend the practical aspects of medicine;

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(i) ENT	-10 marks
(ii) Ophthalmology	-10 marks
(iii) Dentistry	-05 marks
Section– 2: -Systemic Surgery	
Homoeoapthic Thereapeutics	25 marks
(i) ENT Homoeopathic Therapeutics	-10 marks
(ii) Ophthalmology Homoeopathic Therapeutics	-10 marks
(iii) Dentistry Homoeopathic Therapeutics	-05 marks

2. Practical including viva voce or oral:

2.1. Marks: 200

2.2. Distribution of marks;	Marks
2.2.1. One long case	40
2.2.2. Identification of instruments, X-rays	30
2.2.3. Practical records, case records or journal	30
2.2.4. Viva voce (oral)	100
Total	200

PRACTICE OF MEDICINE

Instructions:

I (a) Homoeopathy has a distinct approach to the concept of disease;

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(2) knowledge of causation, manifestations, diagnosis (including differential diagnosis), prognosis and management of diseases.

(3) application of knowledge of organon of medicine and homoeopathic philosophy in dealing with the disease conditions.

(4) comprehension of applied part.

(5) sound clinical training at bedside to be able to apply the knowledge and clinical skill accurately.

(6) adequate knowledge to ensure that rational investigations are utilised.

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(b) Hahnemann's theory of chronic miasms provides us an evolutionary understanding of the chronic diseases: psora, sycosis, syphilis and acute manifestations of chronic diseases and evolution of the natural disease shall be comprehended in the light of theory of chronic miasms.

IV (a) The teaching shall include homoeopathic therapeutics or management in respect of all topics and clinical methods of examination of patient as a whole will be given due stress during the training;

(b) A thorough study of the above areas will enable a homoeopathic physician to comprehend the practical aspects of medicine;

(c) He shall be trained as a sound clinician with adequate ability of differentiation, sharp observation and conceptual clarity about diseases by taking help of all latest diagnostic techniques, viz. X-ray, ultrasound, electrocardiogram, and commonly performed laboratory investigations;

(d) Rational assessment of prognosis and general management of different disease conditions are also to be focused.

V Study of subject. - The study of the subject will be done in two years in Third B.H.M.S and Fourth B.H.M.S, but examination shall be conducted at the end of Fourth B.H.M.S.

Third B.H.M.S

Theory:

1. Applied anatomy and applied physiology of the respective system as stated below.
2. Respiratory diseases.
3. Diseases of digestive system and peritoneum.
4. Diseases concerning liver, gall-bladder and pancreas.
5. Genetic Factors (co-relating diseases with the concept of chronic miasms).
6. Immunological factors in diseases with concept of susceptibility (including HIV, Hepatitis-B)
7. Disorders due to chemical and physical agents and to climatic and environmental factors.
8. Knowledge of clinical examination of respective systems.
9. Water and electrolyte balance – disorders of.

Fourth B.H.M.S

A. Theory:

1. Nutritional and metabolic diseases
2. Diseases of haemopoietic system.
3. Endocrinal diseases.
4. Infectious diseases.
5. Diseases of cardiovascular system.
6. Diseases of urogenital Tract.
7. Disease of CNS and peripheral nervous system.
8. Psychiatric disorders.
9. Diseases of locomotor system (connective tissue, bones and joints disorders)
10. Diseases of skin and sexually transmitted diseases.
11. Tropical diseases.
12. Paediatric disorders.
13. Geriatric disorders.
14. Applied anatomy and applied physiology of different organ and systems relating to specific diseases.
15. Knowledge of clinical examination of respective systems.

(a) General management and homoeopathic therapeutics for all the topics to be covered in Third B.H.M.S and Fourth B.H.M.S shall be taught simultaneously and the emphasis shall be on study of man in respect of health, disposition, diathesis, disease, taking all predisposing and precipitating factors, i.e. fundamental cause, maintaining cause and exciting cause.

(b) Study of therapeutics does not mean simply list of specifics for the clinical conditions but teaching of applied materia medica which shall be stressed upon.

Practical or clinical:

(a) Each candidate shall submit of twenty complete case records (ten in Third B.H.M.S and ten in Fourth B.H.M.S).

2.2. Distribution of marks;	Marks
2.2.1. Medico-legal aspect of 4 specimens	40
2.2.3. Journal or practical records	10
2.2.4. Viva voce (oral)	50
Total	100

REPERTORY

Instructions:

I. (a) Repertorisation is not the end but the means to arrive at the simillimum with the help of materia medica, based on sound knowledge of Homoeopathic Philosophy;

(b) Homoeopathic materia medica is an encyclopedia of symptoms. No mind can memorize all the symptoms or all the drugs with their gradations;

(c) The repertory is an index and catalogue of the symptoms of the materia medica, neatly arranged in a practical or clinical form, with the relative gradation of drugs, which facilitates quick selection of indicated remedy and it may be difficult to practice Homoeopathy without the aid of repertories.

II. (a) Each repertory has been compiled on distinct philosophical base, which determines its structure;

(b) In order to explore and derive full advantage of each repertory, it is important to grasp thoroughly its conceptual base and construction and this will help student to learn scope, limitations and adaptability of each repertory.

Third B.H.M.S

A. Theory:

1. Repertory: Definition; Need; Scope and Limitations.
2. Classification of Repertories
3. Study of different Repertories (Kent, Boenninghausen, Boger-Boenninghausen):
   - (a) History
   - (b) Philosophical background
   - (c) Structure
   - (d) Concept of repertorisation
   - (e) Adaptability
   - (f) Scope
   - (g) Limitation(s)
4. Gradation of Remedies by different authors.
5. Methods and techniques of repertorisation. Steps of repertorisation.
6. Terms and language of repertories (Rubrics) cross references in other repertories and materia medica.
7. Conversion of symptoms into rubrics and repertorisation using different repertories.
8. Repertory – its relation with organon of medicine and materia medica.
9. Case taking and related topics:
   - (a) case taking.
   - (b) difficulties of case taking, particularly in a chronic case.
   - (c) types of symptoms, their understanding and importance.
   - (d) importance of pathology in disease diagnosis and individualisation in relation to study of repertory.
10. Case processing

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Arihant Homoeopathic
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2.2. Distribution of marks;	Marks
2.2.1. Medico-legal aspect of 4 specimens	40
2.2.3. Journal or practical records	10
2.2.4. Viva voce (oral)	50
Total	100

REPERTORY

Instructions:

I. (a) Repertorisation is not the end but the means to arrive at the simillimum with the help of materia medica, based on sound knowledge of Homoeopathic Philosophy;

(b) Homoeopathic materia medica is an encyclopedia of symptoms. No mind can memorize all the symptoms or all the drugs with their gradations;

(c) The repertory is an index and catalogue of the symptoms of the materia medica, neatly arranged in a practical or clinical form, with the relative gradation of drugs, which facilitates quick selection of indicated remedy and it may be difficult to practice Homoeopathy without the aid of repertories.

II. (a) Each repertory has been compiled on distinct philosophical base, which determines its structure;

(b) In order to explore and derive full advantage of each repertory, it is important to grasp thoroughly its conceptual base and construction and this will help student to learn scope, limitations and adaptability of each repertory.

Third B.H.M.S

A. Theory:

1. Repertory: Definition; Need; Scope and Limitations.
2. Classification of Repertories
3. Study of different Repertories (Kent, Boenninghausen, Boger-Boenninghausen):
   (a) History
   (b) Philosophical background
   (c) Structure
   (d) Concept of repertorisation
   (e) Adaptability
   (f) Scope
   (g) Limitation(s)
4. Gradation of Remedies by different authors.
5. Methods and techniques of repertorisation. Steps of repertorisation.
6. Terms and language of repertories (Rubrics) cross references in other repertories and materia medica.
7. Conversion of symptoms into rubrics and repertorisation using different repertories.
8. Repertory – its relation with organon of medicine and materia medica.
9. Case taking and related topics:
   (a) case taking.
   (b) difficulties of case taking, particularly in a chronic case.
   (c) types of symptoms, their understanding and importance.
   (d) importance of pathology in disease diagnosis and individualisation in relation to study of repertory.
10. Case processing

(a) analysis and evaluation of symptoms

(b) miasmatic assessment

(c) totality of symptoms or conceptual image of the patient

(d) repertorial totality

(e) selection of rubrics

(f) repertorial technique and results

(g) repertorial analysis

B. Practical or clinical:

1. Record of five cases each of surgery, gynaecology and obstetrics worked out by using Kent's repertory.

2. Rubrics hunting from Kent's & Boenninghausen's repertories.

Note: There will be no Examination in the subject in Third B.H.M.S.

Fourth B.H.M.S

A. Theory:

1. Comparative study of different repertories (like Kent's Repertory, Boenninghausen's Therapeutic Pocket Book and Boger- Boenninghausen's Charactetristic Repertories, A Synoptic Key to Materia Medica).

2. Card repertories and other mechanical aided repertories– History, Types and Use.

3. Concordance repertories (Gentry and Knerr)

4. Clinical Repertories (William Boericke etc.)

5. An introduction to modern thematic repertories- (Synthetic, Synthesis and Complete Repertory and Murphy's Repertory)

6. Regional repertories

7. Role of computers in repertorisation and different softwares.

B. Practical or clinical:

Students shall maintain the following records, namely:-

1. Five acute and five chronic cases (each of medicine, surgery and obstetrics and gynaecology) using Kent's Repertory.

2. Five cases (pertaining to medicine) using Boenninghausen's therapeutics pocket book.

3. Five cases (pertaining to medicine) using Boger-Boenninghausen's characteristics repertory.

4. Five cases to be cross checked on repertories using homoeopathic softwares.

C. Examination:

There will be examination of repertory only in Fourth B.H.M.S (not in III BHMS).

1. Theory:

1.1. Number of papers-01

1.2. Marks: 100

2. Practical including viva voce or oral:

2.1. Marks: 100

2.2. Distribution of marks:	Marks
2.2.1. One long case	30
2.2.2. One short case	10
2.2.3. Practical record or journal	10
2.2.4. Viva Voce (Oral)	50

2.2.4. Viva voce (oral)	50
Total	100

SURGERY

Instructions:

I (a) Homoeopathy as a science needs clear application on part of the physician to decide about the best course of action(s) required to restore the sick, to health;

(b) Knowledge about surgical disorders is required to be grasped so that the Homoeopathic Physician is able to:-

(1) Diagnose common surgical conditions.

(2) Institute homoeopathic medical treatment wherever possible.

(3) Organise Pre and Post-operative Homoeopathic medicinal care besides surgical intervention with the consent of the surgeon.

II For the above conceptual clarity and to achieve the aforesaid objectives, an effective co-ordination between the treating surgeons and homoeopathic physicians is required keeping in view the holistic care of the patients and it will also facilitate the physician in individualising the patient, necessary for homoeopathic treatment and management.

III The study shall start in Second B.H.MS and complete in Third B.H.M.S. and examination shall be conducted in Third B.H.MS.

IV (a) Following is a plan to achieve the above and it takes into account about the Second and Third year B.H.M.S syllabus and respective stage of development;

(b) Throughout the whole period of study, the attention of the students should be directed by the teachers of this subject to the importance of its preventive aspects.

V There shall be periodical inter-departmental seminars, to improve the academic knowledge, skill and efficiency of the students and the study shall include training on, –

(a) principles of surgery,

(b) fundamentals of examination of a patient with surgical problems

(c) use of common instruments for examination of a patient.

(d) physiotherapy measures.

(e) applied study of radio-diagnostics.

(f) knowledge of causation, manifestations, management and prognosis of surgical disorders.

(g) miasmatic background of surgical disorders, wherever applicable.

(h) bedside clinical procedures.

(i) correlation of applied aspects, with factors which can modify the course of illness, including application of medicinal and non-medicinal measures.

(j) role of homoeopathic treatment in pseudo-surgical and true surgical diseases.

Second B.H.M.S

A. Theory:

(a) General Surgery:-

1. Introduction to surgery and basic surgical principles.

2. Fluid, electrolytes and acid-base balance.

3. Haemorrhage, haemostasis and blood transfusion.

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Medical College & R.I.
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2.2.4. Viva voce (oral)	50

Total	100

SURGERY

Instructions:

I (a) Homoeopathy as a science needs clear application on part of the physician to decide about the best course of action(s) required to restore the sick, to health;

(b) Knowledge about surgical disorders is required to be grasped so that the Homoeopathic Physician is able to:-

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V There shall be periodical inter-departmental seminars, to improve the academic knowledge, skill and efficiency of the students and the study shall include training on, –

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(d) physiotherapy measures.

(e) applied study of radio-diagnostics.

(f) knowledge of causation, manifestations, management and prognosis of surgical disorders.

(g) miasmatic background of surgical disorders, wherever applicable.

(h) bedside clinical procedures.

(i) correlation of applied aspects, with factors which can modify the course of illness, including application of medicinal and non-medicinal measures.

(j) role of homoeopathic treatment in pseudo-surgical and true surgical diseases.

Second B.H.M.S

A. Theory:

(a) General Surgery:-

1. Introduction to surgery and basic surgical principles.

2. Fluid, electrolytes and acid-base balance.

3. Haemorrhage, haemostasis and blood transfusion.

4. Boil, abscess, carbuncle, cellulitis and erysipelas.

5. Acute and chronic infections, tumors, cysts, ulcers, sinus and fistula.

6. Injuries of various types; preliminary management of head injury

7. Wounds, tissue repair, scars and wound infections.

8. Special infections (Tuberculosis, Syphilis, Acquired Immuno Defeciency Syndrome, Actinomycosis, Leprosy).

9. Burn

10. Shock

11. Nutrition

12. Pre-operative and post-operative care.

13. General management, surgical management and homoeopathic therapeutics of the above topics will be covered.

Examination: There will be no examination in the subject in Second B.H.M.S.

Third B.H.M.S

A. Theory:

(b) Systemic Surgery:-

1. Diseases of blood vessels, lymphatics and peripheral nerves

2. Diseases of glands

3. Diseases of extremities

4. Diseases of thorax and abdomen

5. Diseases of alimentary tract

6. Diseases of liver, spleen, gall bladder and bile duct.

7. Diseases of abdominal wall, umbilicus, hernias.

8. Diseases of heart and pericardium.

9. Diseases of urogenital system.

10. Diseases of the bones, cranium, vertebral column, fractures and dislocations.

11. Diseases of the joints.

12. Diseases of the muscles, tendons and fascia.

B. Ear

1. Applied anatomy and applied physiology of ear

2. Examination of ear

3. Diseases of external, middle and inner ear

C. Nose

1. Applied anatomy and physiology of nose and paranasal sinuses.

2. Examination of nose and paranasal sinuses

3. Diseases of nose and paranasal sinuses

D. Throat

1. Applied Anatomy and applied Physiology of pharynx, larynx, tracheobronchial tree, oesophagus

2. Examination of pharynx, larynx, tracheobronchial tree, oesophagus

3. Diseases of Throat (external and internal)

4. Diseases of oesophagus.

E. Ophthalmology

1. Applied Anatomy, Physiology of eye
2. Examination of eye.
3. Diseases of eyelids, eyelashes and lacrimal drainage system.
4. Diseases of Eyes including injury related problems.

F. Dentistry

1. Applied anatomy, physiology of teeth and gums;

2. Milestones related to teething.

3. Examination of Oral cavity.

4. Diseases of gums

5. Diseases of teeth

6. Problems of dentition

General management, surgical management and homoeopathic therapeutics of the above topics will be covered.

Practical or clinical:

(To be taught in Second and Third B.H.M.S.)

1. Every student shall prepare and submit twenty complete histories of surgical cases, ten each in the Second and Third B.H.M.S. classes respectively.

2. Demonstration of surgical Instruments, X-rays, specimens etc.

3. Clinical examinations in Surgery.

4. Management of common surgical procedures and emergency procedures as stated below:

(a) Wounds

(b) Abscesses: incision and drainage.

(c) Dressings and plasters.

(d) Suturing of various types.

(e) Pre-operative and post-operative care.

(f) Management of shock.

(g) Management of acute haemorrhage.

(h) Management of acute injury cases.

(i) Preliminary management of a head Injury case.

Examination:

It will be conducted in Third B.H.M.S (not in Second B.H.M.S).

1. Theory:

1.1. Number of papers - 02

1.2. Marks: Paper I-100;Paper II-100

1.3. Contents:

1.3.1. Paper –I:

Section –1- General Surgery- 50 marks

Section – 2-

Homoeopathic Therapeutics relating to General Surgery – 50 marks

1.3.2. Paper –II:

Section– 1-Systemic Surgery 25 marks

(i) ENT	-10 marks
(ii) Ophthalmology	-10 marks
(iii) Dentistry	-05 marks
Section– 2: -Systemic Surgery	
Homoeoapthic Thereapeutics	25 marks
(i) ENT Homoeopathic Therapeutics	-10 marks
(ii) Ophthalmology Homoeopathic Therapeutics	-10 marks
(iii) Dentistry Homoeopathic Therapeutics	-05 marks

2. Practical including viva voce or oral:

2.1. Marks: 200

2.2. Distribution of marks;	Marks
2.2.1. One long case	40
2.2.2. Identification of instruments, X-rays	30
2.2.3. Practical records, case records or journal	30
2.2.4. Viva voce (oral)	100
Total	200

PRACTICE OF MEDICINE

Instructions:

I (a) Homoeopathy has a distinct approach to the concept of disease;

(b) it recognises an ailing individual by studying him as a whole rather than in terms of sick parts and emphasizes the study of the man, his state of health, state of Illness.

II The study of the above concept of individualisation is essential with the a following background so that the striking features which are characteristic to the individual become clear, in contrast to the common picture of the respective disease conditions, namely:–

(1) correlation of the disease conditions with basics of anatomy, physiology and, biochemistry and pathology.

(2) knowledge of causation, manifestations, diagnosis (including differential diagnosis), prognosis and management of diseases.

(3) application of knowledge of organon of medicine and homoeopathic philosophy in dealing with the disease conditions.

(4) comprehension of applied part.

(5) sound clinical training at bedside to be able to apply the knowledge and clinical skill accurately.

(6) adequate knowledge to ensure that rational investigations are utilised.

III (a) The emphasis shall be on study of man in respect of health, disposition, diathesis, disease, taking all predisposing and precipitating factors, i.e. fundamental cause, maintaining cause and exciting cause;

(b) Hahnemann's theory of chronic miasms provides us an evolutionary understanding of the chronic diseases: psora, sycosis, syphilis and acute manifestations of chronic diseases and evolution of the natural disease shall be comprehended in the light of theory of chronic miasms.

IV (a) The teaching shall include homoeopathic therapeutics or management in respect of all topics and clinical methods of examination of patient as a whole will be given due stress during the training;

(b) A thorough study of the above areas will enable a homoeopathic physician to comprehend the practical aspects of medicine;

CENTRAL COUNCIL OF INDIAN MEDICINE
NEW DELHI

SYLLABUS OF AYURVEDACHARYA (BAMS) COURSE

INDEX

1ST PROFESSIONAL

1.1 PADARTHA VIGYAN EVUM AYURVEDA ITIHAS
(Philosophy and History of Ayurveda)

Theory- Two papers– 200 marks (100 each paper)
Total teaching hours: 150 hours

PAPER-I **Padartha Vigyanam** **100marks**

PART A **50 marks**

1. Ayurveda Nirupana

1.1 Lakshana of Ayu, composition of Ayu.
1.2 Lakshana of Ayurveda.
1.3 Lakshana and classification of Siddhanta.
1.4 Introduction to basic principles of Ayurveda and their significance.

2. Ayurveda Darshana Nirupana

2.1 Philosophical background of fundamentals of Ayurveda.
2.2 Etymological derivation of the word "Darshana". Classification and general introduction to schools of Indian Philosophy with an emphasis on: Nyaya, Vaisheshika, Sankhya and Yoga.
2.3 Ayurveda as unique and independent school of thought (philosophical individuality of Ayurveda).
2.4 Padartha: Lakshana, enumeration and classification, Bhava and Abhava padartha, Padartha according to Charaka (Karana-Padartha).

3. Dravya Vigyaniyam

3.1 **Dravya**: Lakshana, classification and enumeration.
3.2 **Panchabhuta**: Various theories regarding the creation (theories of Taittiriyopanishad, Nyaya-Vaisheshika, Sankhya-Yoga, Sankaracharya, Charaka and Susruta), Lakshana and qualities of each Bhoota.
3.3 **Kaala**: Etymological derivation, Lakshana and division / units, significance in Ayurveda.
3.4 **Dik**: Lakshana and division, significance in Ayurveda.
3.5 **Atma**:Lakshana, classification, seat, Gunas, Linga according to Charaka, the method / process of knowledge formation (*atmanah jnasya pravrittih*).
3.6 **Purusha:** as mentioned in Ayurveda - Ativahikapurusha/ Sukshmasharira/ Rashipurusha/ Chikitsapurusha/ Karmapurusha/ Shaddhatvatmakapurusha.
3.7 **Manas**: Lakshana, synonyms, qualities, objects, functions, dual nature of mind (*ubhayaatmakatvam*), as a substratum of diseases, penta-elemental nature (*panchabhutatmakatvam*).
3.8 Role of Panchamahabhuta and Triguna in Dehaprakriti and Manasaprakriti respectively.
3.9 Tamas as the tenth Dravya.
3.10 Practical study/application in Ayurveda.

PART B **50 marks**

4. **Gunavigyaniyam**
   - 4.1 Etymological derivation, classification and enumeration according to Nyaya-Vaisheshika and Charaka, Artha, Gurvadiguna, Paradiguna, Adhyatmaguna.
   - 4.2 Lakshana and classification of all the 41 gunas.
   - 4.3 Practical / clinical application in Ayurveda.

5. **Karma Vigyaniyam**
   - **5.1** Lakshana, classification in Nyaya.
   - **5.2** Description according to Ayurveda.
   - **5.3** Practical study/ application in Ayurveda.

6. **Samanya Vigyaniyam**
   - 6.1 Lakshana, classification.
   - 6.2 Practical study/ application with reference to Dravya, Guna and Karma.

7. **Vishesha Vigyaniyam**
   - **7.1** Lakshana, classification.
   - **7.2** Practical study/ application with reference to Dravya, Guna and Karma.
   - **7.3** Significance of the statement "*Pravrittirubhayasya tu*".

8. **Samavaya Vigyaniyam**
   - 8.1 Lakshana
   - 8.2 Practical study /clinical application in Ayurveda.

9. **Abhava Vigyaniyam**
   - 9.1 Lakshana, classification
   - 9.2 Clinical significances in Ayurveda.

PAPER II **Padartha Vigyan and Ayurveda Itihas** **100 marks**

PART A - Pramana/ Pariksha- Vigyaniyam **75 marks**

1. **Pariksha**
   - 1.1. Definition, significance, necessity and use of *Pariksha.*
   - 1.2. Definition of *Prama, Prameya, Pramata, Pramana.*
   - 1.3. Significance and importance of *Pramana,* Enumeration of *Pramana* according to different schools of philosophy.
   - 1.4. Four types of methods for examination in *Ayurveda* (Chaturvidha-Parikshavidhi), *Pramana* in Ayurveda.
   - 1.5. Subsudation of different *Pramanas* under three *Pramanas.*
   - 1.6. Practical application of methods of examination (Parikshavidhi) in treatment (Chikitsa).

2. **Aptopdesha Pariksha/ Pramana**
   - 2.1. Lakshana of Aptopadesha, Lakshana of Apta.
   - 2.2. Lakshana of Shabda, and its types.
   - 2.3. Shabdavritti-Abhidha, Lakshana, Vyanjana and Tatparyakhya. Shaktigrahahetu.
   - 2.4. Vaakya: Characteristics, Vaakyarthagyanahetu- Aakanksha, Yogyata, Sannidhi.

3. Pratyaksha Pariksha/ Pramana

3.1. Lakshana of Pratyaksha, types of Pratyaksha- Nirvikalpaka- Savikalpaka with description, description of Laukika and Alaukika types and their further classification.

3.2. Indriya-prapyakaritvam, six types of Sannikarsha.

3.3. Indriyanam lakshanam, classification and enumeration of Indriya. Description of Panchapanchaka, Penta-elemental nature of Indriya by Panchamahabhuta (*Panchabhautikatwa* of Indriya) and similarity in sources (*Tulyayonitva*) of Indriya.

3.4. Trayodasha Karana, dominance of Antahkaran.

3.5. Hindrances in direct perception (*pratyaksha-anupalabdhikaaran*), enhancement of direct perception (Pratyaksha) by various instruments/ equipments, necessity of other Pramanas in addition to Pratyaksha.

3.6. Practical study/ application of Pratyaksha in physiological, diagnostic, therapeutics and research grounds.

4. Anumanapariksha/Pramana

4.1. Lakshana of Anumana. Introduction of Anumiti, Paramarsha, Vyapti, Hetu, Sadhya, Paksha, Drishtanta. Types of Anumana mentioned by Charaka and Nyayadarshana.

4.2. Characteristic and types of Vyapti.

4.3. Lakshana and types of Hetu, description of Ahetu and Hetwabhasa.

4.4. Characteristic and significance of Tarka.

4.5. Practical study/ application of Anumanapramana in physiological, diagnostic, therapeutics and research.

5. Yuktipariksha/ Pramana

5.1. Lakshana and discussion.

5.2. Importance in Ayurveda.

5.3. Practical study and utility in therapeutics and research.

6. Upamana Pramana

6.1 Lakshana.

6.2 Application in therapeutics and research.

7. Karya- Karana Siddhanta (Cause and Effect Theory)

7.1. Lakshana of Karya and Karana. Types of Karana.

7.2. Significance of Karya and Karana in Ayurveda.

7.3. Different opinions regarding the manifestation of Karya from Karana: Satkaryavada, Asatkaryavada, Parinamavada, Arambhavada, Paramanuvada, Vivartavada, Kshanabhangurvada, Swabhavavada, Pilupaka, Pitharpaka, Anekantavada, Swabhavoparamavada.

PART B - Ayurved Itihas **25 marks**

1. Etymological derivation (Vyutpatti), syntactical derivation (Niruktti) and definition of the word Itihas, necessity of knowledge of history, its significance and utility, means and method of history, historical person (Vyakti), subject (Vishaya), time period (Kaal), happening (Ghatana) and their impact on Ayurveda.

2. Introduction to the authors of classical texts during Samhitakaal and their contribution: Atreya, Dhanwantari, Kashyapa, Agnivesha, Sushruta, Bhela, Harita, Charaka,

Dridhabala, Vagbhata, Nagarjuna, Jivaka.

3. Introduction to the commentators of classical Samhitas – Bhattarahariccchandra, Jejjata, Chakrapani, Dalhana, Nishchalakara, Vijayarakshita, Gayadas, Arunadutta, Hemadri, Gangadhara, Yogindranath Sen, Haranachandra, Indu.

4. Introduction to the authors of compendiums (Granthasamgrahakaala) – Bhavmishra, Sharngadhara, Vrinda, Madhavakara, Shodhala, Govinda Das (Author of Bhaishajyaratnawali), Basavraja.

5. Introduction to the authors of Modern era –Gana Nath Sen, Yamini Bhushan Rai, Shankar Dajishastri Pade, Swami Lakshmiram, Yadavji Tikramji, Dr. P. M. Mehta, Ghanekar, Damodar Sharma Gaur, Priyavrat Sharma.

6. Globalization of Ayurveda – Expansion of Ayurveda in Misra (Egypt), Sri Lanka, Nepal other nations.

7.
   a) Developmental activities in Ayurveda in the post-independence period, development in educational trends.
   b) Establishment of different committees, their recommendations.
   c) Introduction to and activities of the following Organizations :- Department of AYUSH, Central Council of Indian Medicine, Central Council for Research in Ayurvedic Sciences, Ayurvedic Pharmacopeia commission, National Medicinal Plants Board, Traditional Knowledge Digital Library (TKDL)
   d) Introduction to the following National Institutions :
      - National Institute of Ayurved, Jaipur.
      - IPGT&RA, Gujrat Ayurved University, Jamnagar.
      - Faculty of Ayurved, BHU, Varanasi.
      - Rashtriya Ayurveda Vidyapeetha, New Delhi.
   e) Drug and Cosmetic Act.

8. Introduction to national & international popular journals of Ayurveda.

9. Introduction to activities of WHO in the promotion of Ayurved.

Reference Books:-

A). Padartha Vigyan:-

1.	Padarthavigyan	Acharya Ramraksha Pathak
2.	Ayurvediya Padartha Vigyana	Vaidya Ranjit Rai Desai
3.	Ayurved Darshana	Acharya Rajkumar Jain
4.	Padartha Vigyana	Kashikar
5.	Padartha Vigyana	Balwant Shastri
6.	Sankhyatantwa Kaumadi	GajananS hastri
7.	Psycho Pathology in Indian Medicine	Dr. S.P. Gupta
8.	Charak Evum Sushrut ke Darshanik Vishay ka Adhyayan	Prof. Jyotirmitra Acharya
9.	Ayurvediya Padartha Vigyana	Dr. Ayodhya Prasad Achal
10.	Padartha Vigyana	Dr. Vidyadhar Shukla
11.	Padartha Vigyana	Dr. Ravidutta Tripathi
12.	Ayurvediya Padartha Vigyana	Vaidya Ramkrishna Sharma Dhand
13.	Ayurvediya Padartha Vigyan Parichaya	Vaidya Banwarilal Gaur
14.	Ayurvediya Padartha Darshan	Pandit Shivhare

15. Scientific Exposition of Ayurveda — Dr. Sudhir Kumar
16. Relevant portions of Charakasamhita, Sushrutasamhita.

B) History of Ayurveda:-

1. Upodghata of Kashyapasamhita Paragraph of acceptance of Indian medicine	Rajguru Hem Raj Sharma
2. Upodghata of Rasa Yogasagar	Vaidy Hariprapanna Sharma
3. Ayurveda Ka Itihas	KaviraSuram Chand
4. Ayurveda Sutra	Rajvaidya Ram Prasad Sharma
5. History of Indian Medicine (1-3 part)	Dr. GirindrNath Mukhopadhyaya
6. A Short history of Aryan Medical Science	Bhagwat Singh
7. History of Indian Medicine	J. Jolly
8. Hindu Medicine	Zimer
9. Classical Doctrine of Indian Medicine	Filiyosa
10. Indian Medicine in the classical age	AcharyaPriyavrata Sharma
11. Indian Medicine (Osteology)	Dr. Harnley
12. Ancient Indian Medicine	Dr. P. Kutumbia
13. Madhava Nidan and its Chief Commentaries (Chapters highlighting history)	Dr. G.J. Mulenbelt
14. Ayurveda Ka BrihatItihasa	Vaidya Atridev Vidyalankara
15. Ayurveda Ka VaigyanikaItihasa	Acharya Priyavrata Sharma
16. Ayurveda Ka PramanikaItihasa	Prof. Bhagwat Ram Gupta
17. History of Medicine in India	Acharya Priyavrata Sharma
18. Vedomein Ayurveda	Vaidya Ram GopalS hastri
19. Vedomein Ayurveda	Dr. Kapil Dev Dwivedi
20. Science and Philosophy of Indian Medicine	Dr. K.N. Udupa
21. History of Indian Medicine from Pre-Mauryan to Kushana Period	Dr. Jyotirmitra
22. An Appraisal of Ayurvedic Material in Buddhist literature	Dr. Jyotirmitra
23. Mahayana Granthon mein nihita Ayurvediya Samagri	Dr. RavindraNathTripathi
24. Jain Ayurveda Sahitya Ka Itihasa	Dr. Rajendra Prakash Bhatnagar
25. Ayurveda- Prabhashaka Jainacharya	Acharya Raj Kumar Jain
26. CharakaChintana	Acharya Priyavrata Sharma
27. Vagbhata Vivechana	Acharya Priyavrata Sharma
28. Atharvaveda and Ayurveda	Dr. Karambelkara
29. Ayurvedic Medicine Past and Present	Pt. Shiv Sharma
30. Ancient Scientist	Dr. O.P. Jaggi
31. Luminaries of Indian Medicine	Dr. K.R. Shrikanta Murthy
32. Ayurveda Ke Itihasa Ka Parichaya	Dr. RaviduttaTripathi
33. Ayurveda Ke Pranacharya	Ratnakara Shastri
34. Ayurveda Itihasa Parichaya	Prof. Banwari Lal Gaur

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1.2 laLd`re

THEORY - ONE PAPER - 100 marks

TEACHING HOURS - 90 hours

PART-A **50 marks**

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1- laKkizdj.ke

2- foHkDR;FkkZ:

3- lfU/kizdj.ke ¼lfU/kfoPNsn:] lfU/kdj.ke~½

4- ekM~fyaxizdj.ke ¼'kCn:ik.;so½

5- /kkrqizdj.ke ¼/kkrq:ik.;so½

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7- leklizdj.ke~

8- izR;;k:

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9- vuqokn:

A) From English / Hindi / regional language to Sanskrit
B) From Sanskrit to English / Hindi / regional language
C) Identification and correction of grammatical errors in the given sentences

The sentences for translation should be selected from the under mentioned reference books-

1) Laghusiddhanta Kaumudi- Acharya Varadaraja (Commentary by Shri Dhananand Shastry)
2) Brihattrayee- (Charaka Samhita, Sushruta Samhita, Ashtanga Hridayam)
3) Anuvada Chandrika-Chakradhara Hansa Nautiyal
4) Sanskruta Ayurved Sudha- Dr. Banwari Lal Gaur
5) Rachananuvada Kaumudi- Dr. Kapildev Dwivedi
6) Bhasha Sopanam- Published by Rashtreeya Samskruta Samsthanam, New Delhi

PART- B **50 marks**

Httett/;;ue¸

1.) V — 25 marks

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2.) 0 — 15 marks

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3.) iŒ prU=e˜vijhf{krdkjde ¼ {ki.kd dFkkr: e[kZif.MrdFkki;ZUre˜ — 10 marks

iŒ pdFkk:½

REFERENCE BOOKS-

1.) Sushruta Samhita, Shareera Sthanam, Chapter-4
2.) Prabhashanam Work Book, Su.sam.chap.4
Published by-AYURVEDA ACADEMY® BANGALORE;
Email-ayuacademy@gmail.com
3.) Vaidyakeeya Subhashita Sahityam - Dr. Bhaskara Govinda Ghanekar
4.) Panchatantra-(Apareekshitakarakam) -Pt. Vishnu Sharma

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1.3KRIYA SHARIR
(PHYSIOLOGY)

Theory-Two Papers-200 Marks (100 marks each)
Teaching hours-180 hours

PAPER- I **100 marks**

PART- A **50 marks**

1. Conceptual study of fundamental principles of Ayurvediya Kriya Sharir e.g - Panchamahabhuta, Tridosha, Triguna, Loka-Purusha Samya, Samanya-Vishesha. Description of basics of Srotas.
2. Definition and synonyms of the term Sharir, definition and synonyms of term Kriya, description of Sharir Dosha and Manasa Dosha. Mutual relationship between Triguna-Tridosha & Panchmahabhuta. Difference between Shaarir and Sharir. Description of the components of Purusha and classification of Purusha, role of Shatdhatupurusha in Kriya Sharira and Chikitsa.
3. Dosha- General description of Tridosha. Inter relationship between Ritu-Dosha-Rasa-Guna. Biological rhythms of Tridosha on the basis of day-night-age-season and food intake. Role of Dosha in the formation of Prakriti of an individual and in maintaining of health. Prakrita and Vaikrita Dosha.
4. Vata Dosha: Vyutpatti (derivation), Nirukti (etymology) of the term Vata, general locations, general properties and general functions of Vata, five types of Vata (Prana, Udana, Samana, Vyana, Apana) with their specific locations, specific properties, and specific functions.
   Respiratory Physiology in Ayurveda, Physiology of speech in Ayurveda.
5. Pitta Dosha: Vyutpatti, Nirukti of the term Pitta, general locations, general properties and general functions of Pitta, five types of Pitta (Pachaka, Ranjaka, Alochaka, Bhrajaka, Sadhaka) with their specific locations, specific properties, and specific functions. Similarities and differences between Agni and Pitta.
6. Kapha Dosha: Vyutpatti, Nirukti of the term Kapha, general locations, general properties and general functions of Kapha, five types of Kapha (Bodhaka, Avalambaka, Kledaka, Tarpaka, Śleshaka) with their specific locations, specific properties, and specific functions.
7. Etiological factors responsible for Dosha Vriddhi, Dosha Kshaya and their manifestations.
8. Concept of Kriyakala.
9. Prakriti:
   a) Deha- Prakriti: Vyutpatti, Nirukti, various definitions and synonyms for the term „Prakriti". Intra-uterine and extra-uterine factors influencing Deha-Prakriti, classification and characteristic features of each kind of Deha-Prakriti.
   b) Manasa- Prakriti: Introduction and types of Manasa- Prakriti.
10. Ahara: Definition, classification and significance of Ahara, Ahara-vidhi-vidhana, Ashta Aharavidhi Viseshayatana, Ahara Parinamkar Bhava.

11. Aharapaka (Process of digestion): Description of Annavaha Srotas and their Mula. Role of Grahani & Pittadhara Kala.
12. Description of Avasthapaka (Madhura, Amla and Katu). Description of Nishthapaka (Vipaka) and its classification. Separation of Sara and Kitta. Absorption of Sara. Genesis of Vata-Pitta-Kapha during Aharapaka process. Definition of the term Koshtha. Classification of Koshtha and the characteristics of each type of Koshtha.
13. Agni – Definition and importance, synonyms, classification, location, properties and functions of Agni and functions of Jatharagni, Bhutagni, and Dhatvagni.

PART- B **50 marks**

Modern Physiology

a) Definition and mechanisms of maintenance of homeostasis. Cell physiology. Membrane physiology. Transportation of various substances across cell membrane.
b) Resting membrane potential and action potential.
c) Physiology of respiratory system: functional anatomy of respiratory system. Definition of ventilation, mechanism of respiration, exchange and transport of gases, neural and chemical control of respiration, artificial respiration, asphyxia, hypoxia. Introduction to Pulmonary Function Tests.
d) Physiology of Nervous System: General introduction to nervous system, neurons, mechanism of propagation of nerve impulse, physiology of CNS, PNS, ANS; physiology of sensory and motor nervous system, Functions of different parts of brain and physiology of special senses, intelligence, memory, learning and motivation. Physiology of sleep and dreams, EEG. Physiology of speech and articulation. Physiology of temperature regulation.
e) Functional anatomy of gastro-intestinal tract, mechanism of secretion and composition of different digestive juices. Functions of salivary glands, stomach, liver, pancreas, small intestine and large intestine in the process of digestion and absorption. Movements of the gut (deglutition, peristalsis, defecation) and their control. Enteric nervous system.
f) Acid-base balance, water and electrolyte balance. Study of basic components of food. Digestion and metabolism of proteins, fats and carbohydrates.
Vitamins & Minerals- sources, daily requirement, functions, manifestations of hypo and hypervitaminosis.

PAPER- II **100 marks**

PART- A **50 marks**

1. **Dhatu:**
Etymology, derivation, definition, general introduction of term Dhatu, different theories related to Dhatuposhana (Dhatuposhana Nyaya)

2. **Rasa Dhatu:**
Etymology, derivation, location, properties, functions and Praman of Rasa-dhatu. Physiology of Rasavaha Srotas, Formation of Rasa Dhatu from Aahara Rasa, circulation of Rasa (Rasa-Samvahana), role of Vyana Vayu and Samana Vayu in Rasa Samvahana. Description of functioning of Hridaya. Ashtavidha Sara (8 types

of Sara), characteristics of Tvakasara Purusha, conceptual study of mutual interdependence (Aashraya-Aashrayi Bhaava) and its relation to Rasa and Kapha. Manifestations of kshaya and Vriddhi of Rasa.

3. Rakta Dhatu:

Etymology, derivation, synonyms, location, properties, functions and Praman of Rakta Dhatu. Panchabhautikatva of Rakta Dhatu, physiology of Raktavaha Srotas, formation of Raktadhatu, Ranjana of Rasa by Ranjaka Pitta, features of Shuddha Rakta, specific functions of Rakta, characteristics of Raktasara Purusha, manifestations of Kshaya and Vriddhi of Raktadhatu, mutual interdependence of Rakta and Pitta.

4. Mamsa Dhatu :

Etymology, derivation, synonyms, location, properties and functions of Mamsa Dhatu, physiology of Mamsavaha Srotasa, formation of Mamsa Dhatu, characteristics of Mamsasara Purusha, manifestations of Kshaya and Vriddhi of Mamsa Dhatu .Concept of Peshi.

5. Meda Dhatu :

Etymology, derivation, location, properties, functions and Praman of Meda Dhatu, physiology of Medovaha Srotas, formation of Medo Dhatu, characteristics of Medasara Purusha and manifestations of Kshaya and Vriddhi of Meda.

6. Asthi Dhatu:

Etymology, derivation, synonyms, location, properties, functions of Asthi Dhatu. Number of Asthi. Physiology of Asthivaha Srotas and formation of Asthi Dhatu, characteristics of Asthisara Purusha, mutual interdependence of Vata and Asthi Dhatu, manifestations of Kshaya and Vriddhi of Asthi Dhatu.

7. Majja Dhatu :

Etymology, derivation, types, location, properties, functions and Praman of Majjaa Dhatu, physiology of Majjavaha Srotas, formation of Majja Dhatu, characteristics of Majja Sara Purusha, relation of Kapha, Pitta, Rakta and Majja, manifestations of Kshaya and Vriddhi of Majja Dhatu.

8. Shukra Dhatu:

Etymology, derivation, location, properties, functions and Praman of Shukra Dhatu, physiology of Shukraravaha Srotas and formation of Shukra Dhatu. Features of Shuddha Shukra, characteristics of Shukra-Sara Purusha, manifestations of Kshaya and Vriddhi of Shukra Dhatu.

9. Concept of **Ashraya-Ashrayi** bhava i.e. inter-relationship among Dosha, Dhatu Mala and Srotas.

10. Ojas: Etymological derivation, definition, formation, location, properties, Praman, classification and functions of Ojas. Description of Vyadhikshamatva. Bala Vriddhikara Bhava. Classification of Bala. Etiological factors and manifestations of Ojavisramsa, Vyapat and Kshaya.

11. **Upadhatu**: General introduction, etymological derivation and definition of the term Upadhatu. Formation, nourishment, properties, location and functions of each Upadhatu.
    a) Stanya: Characteristic features and methods of assessing Shuddha and Dushita Stanya, manifestations of Vriddhi and Kshaya of Stanya.
    b) Artava: Characteristic features of Shuddha and Dushita Artava. Differences between Raja and Artava, physiology of Artavavaha Srotas.
    c) Tvak: classification, thickness of each layer and functions.

12. **Mala:** Etymological derivation and definition of the term Mala. Aharamala: Enumeration and description of the process of formation of Aharamala.
    a) Purisha: Etymological derivation, definition, formation, properties, quantity and functions of Purisha. Physiology of Purishavaha Srotas, manifestations of Vriddhi and Kshhaya of Purisha.
    b) Mutra: Etymological derivation, definition, formation, properties, quantity and functions of Mutra. Physiology of Mutravaha Srotas, physiology of urine formation in Ayurveda, manifestations of Vriddhi and Kshhaya of Mutra.
    c) Sveda: Etymological derivation, definition, formation and functions of Sveda. Manifestations of Vriddhi and Kshaya of Sveda. Discription of Svedvaha Strotas
    d) Dhatumala: Brief description of each type of Dhatumala.

13. **Panchagyanendriya:** Physiological description of Panchagyaanendriya and physiology of perception of Shabda, Sparsha, Rupa, Rasa and Gandha. Physiological description of Karmendriya.
14. **Manas:** Etymological derivation, definition, synonyms, location, properties, functions and objects of Manas. Physiology of Manovaha Srotas.
15. **Atma:** Etymological derivation, definition, properties of Atma. Difference between Paramatma and Jivatma; Characteristic features of existence of Atma in living body.
16. **Nidra:** Nidrotpatti, types of Nidra, physiological and clinical significance of Nidra; Svapnotpatti and types of Svapna.

PART –B **50 marks**

Modern Physiology

1. Haemopoetic system – composition, functions of blood and blood cells, Haemopoiesis (stages and development of RBCs, and WBCs and platelets), composition and functions of bone marrow, structure, types and functions of haemoglobin, mechanism of blood clotting, anticoagulants, physiological basis of blood groups, plasma proteins, introduction to anaemia and jaundice.
2. Immunity, classification of immunity: Innate, acquired and artificial. Different mechanisms involved in immunity: Humoral (B-cell mediated) and T-Cell mediated immunity. Hypersensitivity.
3. Muscle physiology – comparison of physiology of skeletal muscles, cardiac muscles and smooth muscles. Physiology of muscle contraction.
4. Physiology of cardio-vascular system: Functional anatomy of cardiovascular system. Cardiac cycle. Heart sounds. Regulation of cardiac output and venous

return. Physiological basis of ECG. Heart-rate and its regulation. Arterial pulse. Systemic arterial blood pressure and its control.

5. Adipose tissue, lipoproteins like VLDL, LDL and HDL triglycerides.
6. Functions of skin, sweat glands and sebaceous glands.
7. Physiology of male and female reproductive systems. Description of ovulation, spermatogenesis, oogenesis, menstrual cycle.
8. Physiology of Excretion – functional anatomy of urinary tract, functions of kidney. Mechanism of formation of urine, control of micturition. Formation of faeces and mechanism of defecation.
9. Endocrine glands **–** General introduction to endocrine system, classification and characteristics of hormones, physiology of all endocrine glands, their functions and their effects.

PRACTICAL **100 marks**

Teaching hours-180

Ayurvedic practical

1. Assessment of Prakriti
2. Assessment of Dosha (Features of Vriddhi- Kshaya)
3. Assessment of Dhatu (Features of Vriddhi- Kshaya)
4. Assessment of Agni
5. Assessment of Koshtha
6. Assessment of Sara
7. Nadi pariksha

Modern physiology practical

1. Introduction to laboratory instruments- Simple & Compound Microscope, Scalp vein set, bulbs for blood collection, Sahli"s Haemometer, Haemocytometer, pipettes, Urinometer, Albuminometer, Stethoscope, B.P. Apparatus, Harpenden"s caliper, Clinical Hammer, Tuning Fork, Stop Watch, Thermometer, Centrifuge machine, ECG Machine
2. Collection of blood sample – prick, vene-puncture method, use of anticoagulants
3. Preparation of blood smear and staining
4. Estimation of Hemoglobin
5. Microscopic examination of blood
    a. Total RBC count
    b. Total WBC count
    c. Differential leucocyte count
6. Packed cell volume (PCV) demonstration
7. ESR demonstration
8. Bleeding time, Clotting time
9. Blood grouping and Rh typing
10. Examination of Cardio-Vascular system
    a. Pulse examination
    b. Arterial blood pressure measurement
    c. Examination of heart sounds
    d. ECG demonstration
11. Examination of Respiratory system
    a. Respiratory rate
    b. Breath sounds
    c. Spirometry
12. Examination of Nervous System- Sensory & Motor.

13. Urine examination –Physical examination, chemical examination. Test for normal constituents of urine. Detection of specific gravity and reaction of urine.

Distribution of Practical marks

1. Laboratory Practical - 20
2. Human Experiment - 15
3. Spotting - 15
4. Prakriti Saradi pariksha - 20
5. Practical Record - 10
6. Viva- voce - 20

REFERENCE BOOKS:-

- Ayurvediya Kriyasharir - Ranjit Rai Desai
- Kayachikitsa Parichaya - C. Dwarkanath
- Prakrit Agni Vigyan - C. Dwarkanath
- Sharir Kriya Vigyan - Shiv Charan Dhyani
- Abhinava Sharir Kriya Vigyana - Acharya Priyavrata Sharma
- Dosha Dhatu Mala Vigyana - Shankar Gangadhar Vaidya
- Prakrita Dosha Vigyana - Acharya Niranjana Dev
- Tridosha Vigyana - Shri Upendranath Das
- Sharira Tatva Darshana - Hirlekar Shastri
- Prakrita Agni Vigyana - Niranjana Dev
- Deha Dhatvagni Vigyana - Vd. Pt. Haridatt Shastri
- Sharir Kriya Vigyana (Part 1-2) - Acharya Purnchandra Jain
- Sharir Kriya Vigyana - Shri Moreshwar Dutt. Vd.
- Sharira Kriya Vijnana (Part 1 and 2) – Nandini Dhargalkar
- Dosha Dhatu Mala Vigyana - Basant Kumar Shrimal
- Abhinava Sharir Kriya Vigyana - Dr. Shiv Kumar Gaur
- Pragyogik Kriya Sharir - Acharya P.C. Jain
- Kaya Chikitsa Parichaya - Dr. C. Dwarkanath
- Concept of Agni - Vd. Bhagwan Das
- Purush Vichaya - Acharya V.J. Thakar
- Kriya Sharir - Prof. Yogesh Chandra Mishra
- Sharir Kriya Vigyana - Prof. Jayaram Yadav &Dr. Sunil Verma.
- Basic Principles of Kriya-Sharir (A treatise on Ayurvedic Physiology) by Dr. Srikant Kumar Panda
- Sharir Kriya – Part I & Part II – Dr. Ranade, Dr. Deshpande & Dr. Chobhe
- Human Physiology in Ayurveda - Dr Kishor Patwardhan
- Sharirkriya Vignyan Practical Hand Book– Dr.Ranade, Dr.Chobhe, Dr. Deshpande
- Sharir Kriya Part 1 – Dr.R.R.Deshapande, Dr.Wavhal
- Sharir Kriya Part 2 – Dr. R.R.Deshapande, Dr.Wavhal
- Ayurveda Kriya Sharira- Yogesh Chandra Mishra
- Textbook of Physiology - Gyton & Hall
- A Textbook of Human Physiology – A.K.Jain
- Essentials of Medical Physiology - Sembulingam, K.
- Concise Medical Physiology - Chaudhari, Sujit K.
- Principals of Anatomy & Physiology - Tortora & Grabowski
- Textbook of Medical Physiology- Indu Khurana

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1.4 RACHNA SHARIR
(ANATOMY)

Theory- Two Papers-200 Marks–(100 marks each)
Teaching Hours-180 hours

PAPER-I **100 marks**

PART-A **50 marks**

1. Shariropkramaniya Shaarira
Sharira and shaarira vyakhya (definitions of sharira and shaarira), shadangatvam (six regions of the body), anga pratyanga vibhaga (sub divisions). Mrita sharir samshodhan. Shaarira shastra vibhaga, shaarira gyan prayojana . Constitution of purusha according to dhatubheda, panchabhautikatvam, trigunatmakatvam, tridoshamayatvam, karma purusha, and doshadhatumala-mulakatvam.

2. Paribhasha Shaarira
Kurcha, kandara, jala, asthisanghat, seemanta, seevani, rajju, snayu and lasika.

3. Garbha Shaarira
Garbha definitions, explanation of shukra, artava, garbhadhana. Role of tridosha and panchmahabhuta in the fetal development. Beeja, beejabhaga and beejabhagavayava, linga vinischaya, masanumasika garbha vriddhi-krama, garbhottpadakbhava, garbhavriddhikara bhava, garbha poshana, apara nirmana , nabhinadi nirmana. Aanga pratyanga utpatti.

4. Pramana Shaarira: Anguli pramana.

5. Asthi Shaarira
Asthi vyakhya, number, types, asthi swaroopa, vasa, meda and majja.

6. Sandhi Shaarira
Sandhi vyakhya, numbers, types of asthi sandhi.

7. Sira, Dhamani, Srotas Shaarira
a) Definition, types and number of sira and dhamani.
b) Description of Hridaya.
c) Sroto shaarira: Definition, types of srotas and srotomula.

8. Peshi Shaarira
a) Peshi vyakhya, structure, types, number and importance.
b) Description of Peshi.

9. Koshtha Evam Ashaya Shaarira
a) Definition of kostha and number of koshthanga.
b) Types and description of ashaya.

10. Kalaa Shaarira
Kalaa: definition and types.

11. Uttamangiya Shaarira
Shatchakra, ida, pingala and sushumna nadi - brief description.

12. Marma Shaarira

Marma: definition, number, location, classification, clinical importance with viddha lakshana. Explanation of trimarmas. Detail description of marmas.

13. Indriya Shaarira
Definition of indriya, indriya artha and indriya adhisthan, their number and importance. Description of gyanendria, karmendriya and ubhayendriya (manas).

PART-B **50 marks**

1. Definition and branches of anatomy. Preservation methods of the cadaver.

2. Anatomical Terminologies
Anatomical position, Planes, and explanation of anatomical terms related to skin, fasciae, bones, joints and their movements, muscles, ligaments, tendons, blood vessels, nerves,.

3. Embryology
Definitions and branches of embryology. Embryo and fetus. Sperm and ovum, fertilization. Cleavage. Germ layers formation and their derivatives. Laws of heredity, Sex determination and differentiation, Month-wise development of embryo. Foetal circulation, placenta formation, Umbilical cord formation.

4. Osteology
Bone: Definition, ossification, structure and types. Description of bones with clinical anatomy.

5. Arthrology
Joints: Definition, structure types and movements. Description of joints of extremities, vertebral joints and temporomandibular joint with their clinical anatomy.

6. Cardiovascular system
a. Definition, types and structure of arteries and veins.
b. Description of heart and blood vessels with their course and branches.
c. Pericardium with applied aspect.

7. Lymphatic system
Definition, types and structure of lymph vessels, lymph glands with their clinical aspect.

8. Myology
a) Structure and types of muscles.
b) Description of muscles; their origin, insertion, actions, nerve supply and clinical anatomy.

Paper II **100 marks**

Part A **50 marks**

1. Respiratory System
a. Bronchial tree and lungs with their clinical aspects.
b. Respiratory tract: nasal cavity, pharynx, larynx, trachea, bronchial tree.
c. Pleura with its clinical aspects.
d. Diaphragm.

2. Digestive system

a. Organs of digestive tract (alimentary tract) with their clinical aspects.
b. Digestive glands: liver, spleen and pancreas.
c. Description of peritoneum with its clinical aspects.

3. Urinary System

Urinary tract: kidney, ureter, urinary bladder and urethra with their clinical aspects.

4. Reproductive system

a. Male Reproductive system: reproductive organs, tract and glands (prostate and seminal vesicles) with their clinical aspects.
b. Female reproductive system: reproductive organs, tract and glands with their clinical aspects.

5. Endocrinology

Definition, classification & description of endocrine glands (pituitary, thyroid, parathyroid, thymus and suprarenal glands) with clinical aspects.

PART B **50 marks**

6. Nervous System

Nervous system: definition, classification and its importance. Description of brain and spinal cord.
Description of peripheral nervous system: cranial and spinal nerves, nerve plexuses, and autonomic nervous system, formation and circulation of cerebrospinal fluid and blood supply of brain and spinal cord.

7. Sensory organs

Description of structures of eye, ear, nose, tongue and skin with their clinical aspects.

8. Surface and radiological anatomy

a. Study of radio-imaging of limbs, abdomen, pelvis and vertebral column with its clinical application.
b. Surface anatomy of thoracic and abdominal viscera.

PRACTICAL **100 marks**

Teaching hours: 180

Content of practical

1. Practical study of bones
2. Practical study of organs
3. Practical study of surface and radiological anatomy.
4. Shava vichhedana – detailed dissection of the whole body.
5. Practical study of location of marma
6. Demonstration of histology slides (10 slides)

Distribution of marks

1. Spotting -	20 marks
2. Dissected organs and histology slides -	20 Marks
3. Bones, joints, marma -	20 Marks
4. Surface & radiological anatomy -	10 Marks
5. Practical records -	10 Marks
6. Viva-Voce -	20 Marks
Total	**100 Marks**

Reference Books :-

S. No.	Name of Book	Author
1.	Brihat Shariram Vaidyaratna-	P.S. Varrier
2.	Abhinava Shariram-	Acharya Damodar Sharma Gaur
3.	Manava Sharir (Revised Edition)-	Prof. Dinkar Govind Thatte
4.	Manava Bhruna Vigyana -	Prof. Dinkar Govind Thatte
5.	Manava Anga Rekhankan Vikrian -	Prof. Dinkar Govind Thatte
6.	Sharir Rachana Vigyan (English)-	Vaidya P.G. Athawale
7.	Manual of Practical Anatomy Cunnigham Practical Manual Vol-1, Vol-2, Vol-3	
8.	Clinical Anatomy in Ayurveda -	Prof. D.G. Thatte & Prof. Suresh Chandra
9.	Sharir Rachna Vigyan (English)-	Prof. D.G. Thatte
10.	Ayurvedic Human Anatomy -	Prof. Dr. Giridhar M. Kanthi
11.	Regional Anatomy -	B. D. Chaurasia
12.	Rachana Sharir Vigyana -	Dr. Mahendra Sing
13.	elevant chapters of Brihtrayee and Laghuthrayee	
14.	Gray's Anatomy	
15.	Text Book of Human Anatomy-	Inderbir Singh
16.	Clinical Anatomy-	Richard S Snell
17.	Fundamentals of Human Anatomoy-	Dr. Chakraborthy
18.	Human Osteology -	Poddar

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1.5 Maulik Siddhant avum Ashtang Hridaya
(Basic Principles and Ashtang Hridaya- An ancient text of Ayurveda)

Theory- One Paper– 100 marks
Teaching Hours -120 hours

Part A **60 marks**

Ashtang Hridaya Sutrasthana Adhyaya 1 to 15

Part B **40 marks**

1. Ashtang Hridaya Sutrasthana Adhyaya 16 to 30
2. Description of Ashta Prakriti
3. Shastra Lakshan (Tantra), Tantraguna, Tantradosha, Tachitalya, Arthasraya, Kalpana

Reference Books:

1. Astang Hridaya : Hindi commentary by Lalchanda Vaidya
2. Astang Hridaya : Hindi commentary by Vd. B.L. Gaur
3. Astang Hridaya : English commentary by Dr. T. Sreekumar
4. Astang Hridaya : English commentary by Dr. Vishwavasu Gaur
5. Astang Hridaya : Sanskrit commentary by Hemadri
6. Astang Hridaya : Sanskrit commentary by Arunadatta

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Principal
Aarihant Ayurvedic Medical College and Research Institute

Aarihant Ayurvedic Medical College and Research Institute
Bhoyan Rathod, Ghandhinagar

Sociology

Placement: Second Year **Time:** Theory 60 Hours

Course Description: This course is designed to introduce the concepts of Sociology related to community and social institutions in India and its relationship with health, illness and nursing.

Unit	Time (Hrs)	Learning Objectives	Content	Teaching Learning Activities	Assessment Methods
I	1	State the importance of Sociology in Nursing	**Introduction:** * Definition of Sociology * Nature and Scope of the discipline * Importance and application of Sociology in Nursing	* Lecture Discussion	- Essay type - Short answers
II	3	Describe the inter-relationship of individual in society and community	**Individual and Society:** * Society and Community * Nature of Society * Difference between Society and Community * Process of Socialization and individualization * Personal disorganization	* Lecture Discussion	- Essay type - Short answers
III	3	Describe the influence of culture on health and disease	**Culture:** * Nature of culture * Evolution of culture * Diversity and uniformity of culture * Culture and socialization * Transcultural society * Influence on health and disease	* Lecture Discussion * Panel Discussion	- Essay type - Short answers
IV	4	Identify various social groups and their interactions	**Social groups and processes:** *The meaning and classification of groups *Primary & Secondary group *In-group V/s. Out-group, class tribe, caste *Economic, Political, Religious, groups, Mob, Crowd, Public and Audience Interaction & Social Processes *Co-operation, Competition, Conflict *Accommodation, Assimilation & Isolation	* Lecture Discussion	-Essay type - Short answers
V	6	Explain the growth of population in India and its impact on	**Population:** *Society and population *Population distribution in India Demographic characteristics *Malthusian theory of Populations	* Lecture Discussion * Community identification	-Essay type - Short answers -Assessment of report on

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		health	* PopulationexplosioninIndia and its impact on health status * Familywelfareprogrammes		community identification
VI	5	Describethe Institutions offamilyand marriagein India	**FamilyandMarriage:** * Family– functions *Types–Joint,Nuclear,blended andextendedfamily: characteristics *Themodernfamilychanges, problems–dowryetc, welfare services *Changesandlegislationson familyandmarriageinIndia– Marriageacts *Marriage:formsandfunctionsof marriage *Marriageandfamilyproblemsin India *Family,Marriageandtheir influenceonhealthand health practices	* Lecture Discussion *Familycase study	-Essaytype - Short answers -Assessment offamilycase study
VII	7	Describethe classand caste system and their influenceon healthand health practices	**Socialstratification:** *Meaningandtypesof social stratification *TheIndiancastesystem-origin and features *FeaturesofcasteinIndiatoday *Socialclasssystemandstatus *SocialMobility–Meaning& types *Race asabiological concept, criteriaofracial classification *SalientfeaturesofPrimaryraces-Racism *InfluenceofClass,Caste and Raceonhealthandhealth practices	* Lecture Discussion * Community survey	-Essaytype - Short answers -Assessment ofreporton community survey
VIII	6	Describethe typesof communities inIndia,their practicesand theimpacton health	**TypesofCommunitiesinIndia (Rural,UrbanandRegional):** *Featuresofvillage community andcharacteristicsofIndian villagesPanchayatsystem,social dynamics *CommunityDevelopmentproject &planning *ChangesinIndianRurallife *Availabilityofhealthfacilitiesin ruralanditsimpactonhealthand health practices *Urban–Community– features *Thegrowthofcities: urbanizationanditsimpacton healthandhealth practices	* Lecture Discussion *Visitsto ruraland urban community * Community survey	-Essaytype - Short answers -Assessment ofreporton community survey

			* MajorUrbanproblems–Urban Slums * Region:Problemsandimpacton Health		
IX	4	Explainthe process of Social Change	**SocialChange:** * Natureandprocessofsocial change * Factors influencing Social change:culturalchange,Cultural lag. * IntroductiontoTheoriesofsocial change::Linear,Cyclical,Marxian, Functional Roleofnurse-Changeagents	* Lecture Discussion	- Essaytype - Short answers
X	4	Describe the Socialsystem and inter-relationship of social organizations	**SocialOrganizationandSocial System :** * Socialorganization:elements, types * Democraticandauthoritarian modes of participation * Voluntaryassociation * Socialsystem:Definitionand Types of social system * RoleandStatusasstructural elements of social system * Inter-relationshipofinstitutions	* Lecture Discussion * Observation visits	- Essaytype - Short answers - Assessment ofvisitreport
XI	2	Explain the nature and process of socialcontrol	**Socialcontrol:** * Natureandprocessofsocial control * Political, Legal, Religious, Educational,Economic,Industrial andTechnologicalsystem,Norms & Values – Folkways & Mores Customs, Laws and fashion RoleofNurse	* Lecture Discussion * Community survey	- Essaytype - Short answers - Assessment of report on community survey
XII	15	Describethe role of the nurse in dealingwith social problems in India	**SocialProblems:** * Socialdisorganization * Control & planning: poverty, housing,illiteracy, foodsupplies, prostitution, rights of women & children, vulnerable groups: Elderly, handicapped, minority groups and other marginalized groups, child labour, child abuse, delinquencyandcrime,substance abuse, HIV/AIDS * Socialwelfareprogrammesin India RoleofNurse	* Lecture Discussion * Institutional visits	- Essaytype - Short answers - Assessment ofvisitreport

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Pharmacology

Placement: Second Year

Time: Theory–45hours

Course Description: This course is designed to enable students to acquire understanding of pharmaco-dynamics, pharmaco-kinetics, principles of therapeutics and nursing implications.

Unit	Time (Hrs)	Learning Objectives	Content	Teaching Learning Activities	Assessment Methods
I	3	Describe pharmacokinetics, classification and the principles of drug administration	**Introduction to pharmacology:** • Definitions • Sources • Terminology used • Types: Classification • Pharmacodynamics: Actions, therapeutic • Adverse, toxic • Pharmacokinetics: absorption, distribution, metabolism, interaction, excretion • Review: Routes and principles of administration of drugs • Indian pharmacopoeia: Legal issues • Rational use of drugs • Principles of therapeutics	* Lecture Discussion	- Objective type question - Short answers
II	6	Explain Chemotherapy of specific infections and infestations and nurse's responsibilities	**Chemotherapy:** • Pharmacology of commonly used; ❑ Penicillin ❑ Cephalosporins ❑ Aminoglycosides ❑ Macrolide & Broad Spectrum Antibiotics ❑ Sulfonamides ❑ Quinolones ❑ Antiamoebic ❑ Antimalarials ❑ Anthelmintics ❑ Antiscabies agents ❑ Antiviral & anti-fungal agents ❑ Antitubercular drugs ❑ Antileprosy drugs ❑ Anticancer drugs ❑ Immuno-suppressants Composition, action, dosage, route, indications, contraindications, drug interactions, side effects, adverse effects, toxicity and role of nurse	* Lecture Discussion * Drug study/ presentation	- Objective type question - Short answers

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III	2	Describe Antiseptics disinfectants, insecticides and nurse's responsibilities	**Pharmacologyofcommonlyused antiseptics, disinfectants and insecticides :** • Antiseptics: Composition, Action, Dosage, Route, Indications, Contraindication, Druginteractions,Side-effects, Adverse effects, Toxicity & Role of nurse • Disinfectants • Insecticides	* Lecture Discussion * Drugstudy/ presentation	- Objective type question - Short answers
IV	2	DescribeDrugs acting on Gastro Intestinal system and nurse's responsibilities	**DrugsactingonG.I.System:** • Pharmacologyofcommonly used – ❑ Antiemetics ❑ Emetics ❑ Purgatives ❑ Antacids ❑ Cholinergic ❑ Anticholinergics ❑ Fluidandelectrolyte therapy ❑ Antidiarrhoeals ❑ HistaminesComposition, action,dosage, route, indications, contraindications, drug interactions,sideeffects,adverse effects,toxicityandroleof nurse	* Lecture Discussion * Drugstudy/ presentation	- Objective type question - Short answers
V	2	DescribeDrugs used on Respiratory systems and nurse's responsibilities	**DrugsusedonRespiratory Systems :** • Pharmacologyofcommonly used – ❑ Antiasthmatics ❑ Mucolytics ❑ Decongestants ❑ Expectorants ❑ Antitussives ❑ Bronchodilators ❑ Bronchoconstrictors ❑ AntihistaminesComposition, action, dosage, route, indications, contraindications, drug interactions,sideeffects,adverse effects,toxicityandroleofnurse	* Lecture Discussion * Drugstudy/ presentation	- Objective type question - Short answers
VI	2	DescribeDrugs used onUrinarySyste m and nurse's responsibilities	**DrugsusedonUrinarySystem:** • Pharmacologyofcommonly used – ❑ Diureticsand antidiuretics ❑ Urinary antiseptics ❑ Cholinergicand anticholinergics	* Lecture Discussion * Drugstudy/ presentation	- Objective type question - Short answers

			❑ Acidifiers and alkalanizers Composition, action, dosage, route, indications, contraindications, drug interactions,sideeffects,adverse effects,toxicityandroleof nurse		
VII	4	DescribeDrugs used inde-addiction, emergency, deficiency of vitamins &minerals, poisoning, for immunization and immuno-suppressionand nurse's responsibilities	**Miscellaneous:** • Drugsusedinde-addiction • DrugsusedinCPRand emergency • Vitaminsandminerals • Immunosuppresants • Antidotes • Antivenom • Vaccinesandsera	* Lecture Discussion * Drugstudy/ presentation	- Objective type question - Short answers
VIII	1	DescribeDrugs used on skin and mucous membranesand nurse's responsibilities	**Drugsusedonskinandmucous membranes :** • Topical applications for skin, eye,ear,noseandbuccalcavity Antipruritics Composition, action, dosage, route,indications,contraindica-tions, drug interactions, side effects,adverseeffects,toxicity and role of nurse	* Lecture Discussion * Drugstudy/ presentation	- Objective type question - Short answers
IX	8	DescribeDrugs used on Nervous System and nurse's responsibilities	**DrugsactingonNervous system :** • Basic&appliedPharmaco-logy of commonly used : • AnalgesicsandAnaesthetics ❑ Analgesics - Non steroidal anti - inflammatory(NSAID)drugs ❑ Antipyretics ❑ HypnoticsandSedatives - Opioids - Non-Opioids - Tranquilizers - General&localanesthetics - Gases:oxygen,nitrousoxide, carbon-dioxide • Cholinergicandanti-cholinergics: ❑ Musclerelaxants ❑ Majortranquilizers ❑ Anti-psychotics ❑ Antidepressants	* Lecture Discussion * Drugstudy/ presentation	- Objective type question - Short answers

			❑ Anticonvulsants ❑ Adrenergics ❑ Noradregenics ❑ Moodstabilizers ❑ Acetylcholine ❑ Stimulants Composition, action, dosage, route, indications, contraindications, drug interactions,sideeffects,adverse effects,toxicityandroleof nurse		
X	5	DescribeDrugs used on Cardiovascular System and nurse's responsibilities	**Cardiovasculardrugs:** • Haematinics • Cardiotonics • Antianginals • Anti-hypertensives&Vaso dilators • Anti-arrhythmics • Plasma expanders • Coagulants&anticoagulants • Antiplatelets&thrombolytics • Hypolipidemics Composition,action,dosage, route, indications, contra-indications,druginteractions,side effects, adverse effects, toxicity and role of nurse	* Lecture Discussion * Drugstudy/ presentation	- Objective type question - Short answers

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XI	4	Describedrugs used for hormonal disorders and supplementation,contraception and medical termination of pregnancy and nurse's responsibilities	**Drugs used for hormonal disorders&supplementation, contraception and medical termination of pregnancy :** • Insulins&Oralhypoglycemics • Thyroidsupplementsand suppressants • Steroids,Anabolics • Uterinestimulantsand relaxants • Oralcontraceptives • Otherestrogen-progestrone preparations • Corticotrophine& Gonadotropines • Adrenaline • Prostaglandins • Calcitonins • Calciumsalts • Calcium regulators Composition, action, dosage, route, indications, contraindications, drug interactions,sideeffects,adverse	* Lecture Discussion * Drugstudy/ presentation	- Objective type question - Short answers
			effects,toxicityandroleofnurse		
XII	6	Demonstrate awareness ofthecommon drugs used in alternative system of medicine	**Introduction to Drugs used in alternativesystemsofmedicine:** • Ayurveda,Homeopathy,Unani and Siddha etc.	* Lecture Discussion * Observational visit	- Objective type question - Short answers

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PathologyandGenetics

Time: Theory–45hours(Pathology30&Genetics15hrs)

SectionA– Pathology

Placement: SecondYear

Time: Theory–30hours

CourseDescription: Thiscourse isdesigned toenablestudentstoacquireknowledgeof pathology of various disease conditions and apply this knowledge in practice of nursing.

Unit	Time (Hrs)		Learning Objectives	Content	Teaching Learning Activities	Assessment Methods
	Th.	Pr.				
I	3	-	Definethe common termsused in pathology Appreciate the deviations fromnormal to abnormal structureand functions of the body system	**Introduction:** ▫ Importanceofthestudy of pathology ▫ Definitionofterms ▫ Methodsandtechniques ▫ CellularandTissue changes ▫ Infiltrationand regeneration ▫ Inflammationsand Infections ▫ Woundhealing ▫ Vascularchanges • Cellulargrowth, Neoplasms ▫ NormalandCancercell ▫ BenignandMalignant growths ▫ In-situ carcinoma • Disturbancesoffluidand electrolyte imbalance	• Lecture Discussion • Explain usingcharts	- Short answers - Objective type question
II	10	5	Explain Pathological changes in disease conditionsof various systems	**Specialpathology:** • Pathologicalchangesin disease conditions of various systems: • Respiratory tract ▫ Tuberculosis, Bronchitis, Pleural effusion and pneumonia ▫ Lungabscess, emphysema, bronchiectasis ▫ Bronchial asthma, Chronic Obstructive PulmonaryDiseaseand tumours • Cardio-vascularsystem ▫ Pericardialeffusion ▫ Rheumaticheartdisease	• Lecture Discussion • Explain using charts, slides, specimen, X-raysand scans • Visit to Pathology lab, endoscopy unitandOT	- Short answers - Objective type question

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				▫ Infectiveendocarditis, atherosclerosis ▫ Ischemia,infarction&aneurysm • GastroIntestinalTract ▫ Pepticulcer,typhoid ▫ CarcinomaofGItract-buccal, Esophageal, Gastric & intestinal • Liver,Gallbladder&pancreas ▫ Hepatitis,Chronicliver abscess, cirrhosis ▫ Tumoursofliver,gall bladder and pancreas, ▫ Cholecystitis • Kidneys&Urinarytract ▫ Glomerulonephritis, pyelonephritis ▫ Calculi,renalfailure, renal carcinoma &cystitis • Malegenitalsystems ▫ Cryptorchidism,testicular atrophy ▫ Prostatichyperplasia, carcinoma Penis &prostate • Femalegenitalsystem ▫ Fibroids ▫ Carcinomacervixand Endometrium ▫ Vesicular mole, choriocarcinoma ▫ Ectopicgestation ▫ Ovariancyst&tumours • CancerBreast • CentralNervoussystem ▫ Hydrocephalus, Meningitis,encephalitis, ▫ Vascular disorders – thrombosis,embolism ▫ Stroke,paraplegia, quadriplegia ▫ Tumours,meningiomas-gliomas • Metastatictumour • Skeletal system ▫ Bonehealing, osteoporosis, osteomyelitis • Arthritis&tumours		

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III	4	3	Describe various laboratory tests in assessment and monitoring of disease conditions	**Clinicalpathology:** • Variousbloodandbone marrow tests in assessment and monitoring of disease conditions ▫ Hemoglobin ▫ RBC,Whitecell& platelet counts ▫ Bleedingtime,clotting timeandprothrombine time ▫ Bloodgroupingandcross matching ▫ Blood chemistry ▫ Blood culture ▫ Serological and immunologicaltests ▫ Otherbloodtests ▫ ExaminationofBone marrow ▫ Methodsofcollectionof blood specimen for various clinical pathology,biochemistry, microbiology tests, inference and normal values	• Lecture Discussion • Demonstrat ion • Visit to Clinical Pathology & Bio-Chemistry lab and Bloodbank	- Short answers - Objective type question
IV	2	1	Describethe laboratory tests for examination of body cavityfluids, transudates andexudates	**Examinationofbodycavity fluids, transudates and exudates:** • Thelaboratoriestests used in CSF analysis • Examination of other body cavity fluids, transudatesandexudates –sputum, wound discharge, etc • Analysisofgastricand duodenal contents • Analysisofsemen-sperm count, motility and morphology and their importance in infertility • Methodsofcollectionof CSF and other cavity fluids specimen for various clinical pathology,biochemistry, microbiology tests, inference and normal values	• Lecture Discussion • Demonstrat ion	- Short answers - Objective type question

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V	1	1	Describe laboratory tests for examination ofUrineand faeces	**UrineandFaeces:** • Urine ❑ Physicalcharacteristics ❑ Analysis ❑ Cultureandsensitivity • Faeces ❑ Characteristics ❑ Stool examination : occult blood, ova, parasite and cyst, reducingsubstanceetc. • Methodsofcollectionfor various tests, inference and normal values	• Lecture Discussion • Demonstration	- Short answers - Objective type question

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SectionB – Genetics

Placement: SecondYear **Time:**Theory–15 hours

CourseDescription: Thiscourse isdesigned toenablestudentstoacquireunderstandingof Genetics, its role in causation and management of defects and diseases

Unit	Time (Hrs)	Learning Objectives	Content	Teaching Learning Activities	Assessment Methods
I	3	Explain nature, principles and perspectives of heredity	**Introduction:** • Practicalapplicationofgenetics in Nursing • Impactofgeneticconditionon families • Reviewofcellulardivision mitosis and meiosis. • Characteristicsandstructureof genes • Chromosomes–sex determination • Chromosomalaberrations Patterns of inheritance ▫ Mendaliantheoryof inheritance ▫ Multipleallotsandblood groups ▫ Sexlinked inheritance ▫ Mechanismofinheritance ▫ Errorsintransmission (Mutation)	• Lecture Discussion • Explain using charts, slides	- Short answers - Objective type question
II	3	Explain Maternal, prenataland genetic influences ondevelop-ment of defects and diseases	**Maternal,prenatalandgenetic influencesondevelopmentof defects and diseases :** • Conditions affecting the mother:geneticandinfections • Consanguinityatopy • Prenatalnutritionandfood allergies • Maternal Age • Maternaldrugtherapy • Prenataltestingand diagnosis • EffectofRadiation,drugsand chemicals • Infertility • Spontaneousabortion • NeuralTube Defects and the roleofFolicacidinlowering the risks • Downsyndrome(Trisomy21)	• Lecture Discussion • Explain using charts, slides	- Short answers - Objective type question

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III	2	Explainthe screening methodsfor genetic defectsand diseases in neonates and children	**Genetictestinginthenconatesand children:** • Screeningfor □ Congenitalabnormalities □ Developmentaldelay □ Dysmorphism	• Lecture Discussion • Explain using charts, slides	- Short answers - Objective type question
IV	2	Identify genetic disordersin adolescents and adults	**Geneticconditionsofadolescents and adults :** • Cancergenetics–Familial Cancer • Inbornerrorsof metabolism • Bloodgroupallelesand haematologicaldisorder • Genetichaemochro-matosis • Huntington'sdisease • Mentalillness	• Lecture Discussion • Explain using charts, slides	- Short answers - Objective type question
V	5	Describe the role of nurse in genetic servicesand counselling	**ServicesrelatedtoGenetics:** • Genetictesting • Humangenomeproject • Genetherapy • TheEugeniesmovement • GeneticCounselling • LegalandEthicalissues • Roleofnurse	• Lecture Discussion	- Short answers - Objective type question

MedicalSurgicalNursing

(AdultincludingGeriatrics)–I

Placement -Second Year

Time -Theory –210hours
Practical–720hours

Course Description -The purpose of this course is to acquire knowledge and develop proficiency in caring for patients with medical and surgical disorders in varieties of health care settings and athome.

Unit	Time (Hrs)	Le. arning Objectives	Content	Teaching Learning Activities	Assessment Methods
I	15	Appreciate the trends in medical and surgical nursing Describe the role of nurse in caring for adult patient in hospitaland community Describe the conceptsof medical surgical asepsis	**Introduction:** • Introductiontomedicalsurgical nursing – evolution and trends of medical and surgical nursing • ReviewofConceptsofHealth and illness • Disease - concepts, causations, classificationdiseases(ICD-10 or later version), Acute illness Chronic illness & Terminal illness, stages of illness • Review of concepts of comprehensivenursingcarein medical surgical conditions based on nursing process • Role of nurse, patient and familyincareofadultpatient • Roleandresponsibilitiesofa nurse in medical surgical settings : ▫ Out-patientdepartment ▫ In-patientunit ▫ Intensivecareunit ▫ HomeandCommunity settings • IntroductiontoMedical Surgical asepsis : ▫ Inflammation&Infection ▫ Immunity ▫ Woundhealing • CareofSurgicalPatient: ▫ Pre-operative ▫ Intra-operative ▫ Post-operative	• Lecture Discussion • Demonstrati on • Practice session • Supervised clinical practice	- Short answers - Objective type question - Assessment of skills with check list
II	15	Describe the common signs, symptoms,	**Commonsignsandsymptoms and management** • Fluidandelectrolyteimbalance • Vomiting • Dyspneaandcough, respiratory	• Lecture Discussion • Seminar • Case discussion	- Short answers - Objective type question

		problems and their specific nursing interventions	obstruction • Fever • Shock • Unconsciousness,Syncope • Pain • Incontinence • Edema • Agerelatedproblems–Geriatric		
	III 20	Describethe etiology, pathophysiology clinical manifestations, diagnostic measures and management of patients (adults including elderly) with disordersof respiratory system	**Nursingmana gementofpatients (adultsincludingelderly)with respiratory problems :** • Review of anatomy and physiologyofrespiratory system • NursingAssessment–History and Physical assessment • Etiology, Pathophysiology clinical manifestations, diagnosis,treatmentmodalities andmedical,surgical,dietetics & nursing management of adults including elderly with – □ UpperRespiratorytract infections □ Bronchitis □ Asthma □ Emphysema □ Empyema □ Atelectasis □ ChronicObstructivePulmonary Diseases (COPD) □ Bronchiectasis □ Pneumonia □ PulmonaryTuberculosis □ Lungabscess □ Pleuraleffusion □ CystsandTumours □ Chest injuries □ Respiratoryarrestand insufficiency □ Pulmonary embolism Special therapies, alternative therapies,nursingprocedures Drugs used in treatment of respiratory disorders	• Lecture Discussion • Explain usingcharts, graphs, Models, films,slides • Demonstration • Practice session • Case discussions /Seminar • Health education • Supervised clinical practice • Drug book/ presentation	- Essaytype - Short answers - Objective type question - Assessment of skills with check list - Assessment of patient management problem
	IV 30	Describe the etiology, pathophysiology clinical	**Nursingmanagementofpatient (adultsincludingelderly)with disordersofdigestivesystem:** • Review of anatomyand physiologyofdigestivesystem	• Lecture Discussion • Explain using charts, graphs,	- Essaytype - Short answers - Objective

		manifestations, diagnostic measures and management of patients (adults including elderly) with disordersof digestive system	• NursingAssessment–History and physical assessment • Etiology, Pathophysiology clinicalmanifestations, diagnosis,treatmentmodalities andmedical,surgical,dietetics & nursing management • Disordersof: ❑ Oral cavity – lips, gums, tongue,salivaryglandsand teeth ❑ Oesophagus - inflammation stricture,obstruction,bleeding and tumours ❑ Stomachanddeudenum-hiatus hernia, gastritis, peptic and deudenal ulcer, bleeding, tumours, pyloric stenosis ❑ Smallintestinaldisorders-inflammation & infection, enteritis, mal-absorption, obstruction, tumour and perforation ❑ Largeintestinaldisorders-colitis, inflammation and infection, obstruction and tumour and lump ❑ Hernias ❑ Appendix–inflammation, mass, abscess, rupture ❑ Anal&Rectum-hemorrhoides, fissures, fistulas ❑ Peritonitis/Acuteabdomen ❑ Pancreas-inflammation,cyst, abscess and tumours ❑ Liver - inflammation, cyst, abscess, cirrhosis, portal hypertension,hepaticfailure, tumours ❑ Gall Bladder - inflammation, obstruction,stonesandtumours Specialtherapies,alternative therapies Nursingprocedures Drugs used in treatment of disordersofdigestivesystem	Models, films,slides • Demonstration • Practice session • Case discussions /Seminar • Health education • Supervised clinical practice • Drug book/ presentation	type question - Assessment of skills with check list - Assessment of patient management problem
V	30	Describe the etiology, pathophysiology, clinical manifestati	**Nursingmanagementofpatient (adultsincludingelderly)with blood and cardio vascular problems:** • Review of anatomy and physiologyofbloodand cardiovascular system,	• Lecture Discussion • Explain using charts, graphs • Models,	- Essaytype - Short answers - Objective type

		ons,. diagnostic measures and management of patients (adults including elderly) withblood andcardio vascular problems Describe the vascular conditions and its nursing management	• NursingAssessment–History and Physical assessment • Etiology, Pathophysiology clinical manifestations, diagnosis, treatment modalities &medical,surgical,dietetics& nursing management of – • Vascularsystem ❑ Hypertension,Hypotension ❑ Artherosclerosis ❑ Raynaud'sdisease ❑ AneurismandPerpherial vascular disorders Heart • Coronaryarterydiseases ❑ IschemicHeartDisease ❑ Cornoryatherosclerosis ❑ Anginapectoris ❑ Myocardialinfarction • Valvulardisordersoftheheart ❑ Congentialand acquired ❑ RheumaticHeartdiseases • Endocarditis,Pericarditis Myocarditis • Cardio Myopathies • Cardiacdysrhythmias,Heart Block • Congestivecardiacfailure ❑ Cor-pulmonale,pulmonary edema, cardiogenic shock, cardiac tamponade • Cardiacemergenciesandarrest • CardioPulmonaryResuscitation (CPR) • Blood ❑ Anaemias ❑ Polycythemia ❑ Bleedingdisorders,clotting factor defects and platelets defects ❑ Thalassemia ❑ Leukaemias ❑ Leukopeniasand Agranulocytosis ❑ Lymphomas ❑ Myelomas • Specialtherapies ❑ Blood transfusion, safety checks, procedure and requirements,managementof adverse transfusion reaction, recordsforbloodtransfusion.	films,slides • Demonstration • Practice session • Case discussions/ Seminar • Health education • Supervised clinical practice • Drug book/ presentation • Visit to bloodbank • Participation in blood donation camps • Counselling	question - Assessment of skills with check list - Assessment of patient management problem

			▫ Management & counselling of blood donors, phlebotomy procedure & post donation management Blood bank functioning & hospital transfusion committee.Bio-safetyandwastemanagementin relation to blood transfusion ▫ Role of a nurse in Organ donation,retrievalandbanking Alternativetherapies Nursing procedures Drugsusedintreatmentofblood and cardio vascular disorders		
VI	10	Describethe etiology, pathophysiology, Clinical manifestations, diagnostic measures and management of patients (adults including elderly) with disordersof genito-urinary system	**Nursingmanagementofpatient (adultsincludingelderly)with genito-urinary problems :** ▪ Review of anatomy and physiologyofgenito-urinary system ▪ NursingAssessment–History and Physical assessment ▪ Etiology, Pathophysiology clinical manifestations, diagnosis,treatmentmodalities & medical, surgical, dietetics and nursing management of – ▪ Nephritis ▪ Nephroticsyndrome ▪ Nephrosis ▪ Renalcalculus ▪ Tumours ▪ Acuterenalfailure ▪ Chronicrenalfailure ▪ Endstagerenaldisease ▪ Dialysis&renal transport ▪ Congenitaldisorders,urinary infections ▪ Benignprostatehypertrophy ▪ Disorders of ureter, urinary bladder and urethera - inflammation, infection, stricture,obstruction,tumour, prostrate Specialtherapies,alternative therapies Nursingprocedures Drugsusedintreatmentofgenito-urinary disorders	• Lecture Discussion • Explain usingcharts, graphs, Models, films,slides • Demonstration • Practice session • Case discussions/ Seminar • Health education • Supervised clinical practice • Drug book/ presentation	- Essaytype - Short answers - Objective type question - Assessment of skills with check list - Assessment of patient management problem
VII	5	Describe the etiology,	**Nursingmanagement ofdisorders ofmale(adultsincludingelderly) reproductive system :**	• Lecture Discussion • Explain	- Essaytype - Short

		pathophysiology clinical manifestations, diagnostic measures and management of patients (adults including elderly) with disordersof male reproductive system	■ Review of anatomy and physiologyofmalereproductive system ■ NursingAssessment-History and physical assessment ■ Etiology,Pathophysiology, clinical manifestations, diagnosis, treatment modalities &medical,surgical,dietetics& nursing management of disorders of male reproductive system - ■ Congenitalmalformations; cryptorchidism ■ Hypospadiasis&Epispadiasis ■ Infections ■ Testisandadjacentstructures ■ Penis ■ Prostate - inflammation, infection,hypertrophy,tumour ■ SexualDysfunction ■ Infertility ■ Contraception ■ Breast:Gynecomastia,tumour ■ Climacteric changes Specialtherapies,alternative therapies NursingproceduresDrugsusedintreatmentof disordersofmalereproductive system	usingcharts, graphs, Models, films,slides • Demonstration • Practice session • Case discussions/ Seminar • Health education • Supervised clinical practice • Drug book/ presentation	answers -Objective type question - Assessment of skills with check list - Assessment of patient management problem
VIII	10	Describe theetiology, pathophysiology clinical manifestations, diagnostic measures and management of patients (adults including elderly) with disordersof endocrine system	**Nursingmanagement ofpatient (adultsincludingelderly)with disordersofendocrinesystem:** ■ Review of anatomy and physiologyendocrinesystem ■ NursingAssessment-History and Physical assessment ■ Etiology, Pathophysiology, clinical manifestations, diagnosis, treatment modalities &medical,surgical,dietetics& nursing management of – □ DisordersofThyroidand Parathyroid □ Diabetesmellitus □ Diabetesinsipidus □ Adrenaltumour □ Pituitary disorders Specialtherapies,alternative therapies	• Lecture Discussion • Explain usingcharts, graphs, Models, films,slides • Demonstration • Practice session • Case discussions/ Seminar • Health education • Supervised clinical practice	- Essaytype - Short answers - Objective type question - Assessment of skills with check list - Assessment of patient management problem

			NursingproceduresDrugsu sedintreatmentof disordersofendocrine system	• Drug book/ presentation	
IX	10	Describethe etiology, pathophysi ology clinical manifestati ons, diagnostic measures and manageme nt of patients (adults including elderly) with disordersof skin	**Nursingmanagementofpatient (adultsincludingelderly)with disorders ofIntegumentary system:** ■ Review ofanatomy and physiologyofskinandits appendages ■ NursingAssessment-History and Physical assessment ■ Etiology,Pathophysiology, clinical manifestations, diagnosis, treatment modalities &medical,surgical,dietetics& nursing management of disorders of skin and its appendages ❑ Lesionsand abrasions ❑ Infectionandinfestations; Dermatitis ❑ Dermatoses - Infectious and Noninfectious"inflammatory dermatoses" ❑ AcneVulgaris ❑ AllergiesandEczema ❑ Psoriasis ❑ Malignantmelanoma ❑ Alopecia Specialtherapies,alternative therapies NursingproceduresDrugsu sedintreatmentof disordersofIntegumentarysystem	• Lecture Discussion • Explain usingcharts, graphs, Models, films,slides • Demonstrati on • Practice session • Case discussions/ Seminar • Health education • Supervised clinical practice • Drug book/ presentation	- Essaytype - Short answers - Objective type question - Assessment of skills with check list - Assessment of patient managemen t problem
X	15	Describe the etiology, pathophysi ology clinical manifestati ons, diagnostic measures and manageme nt of patients (adults including elderly) with	**Nursingmanagementofpatient (adultsincludingelderly)with musculo-skeletalproblems:** • Review of anatomy and physiologyofmusculo-skeletal system ■ NursingAssessment-History and Physical assessment ■ Etiology, Pathophysiology, clinical manifestations, diagnosis, treatment modalities &medical,surgical,dietetics& nursing management of – • Disordersof- ❑ Muscles,LigamentsandJoints-inflammation, infection, trauma ❑ Bones–inflammation,infection,	• Lecture Discussion • Explain usingcharts, graphs, Models, films,slides • Demonstrati on • Practice session • Case discussions/ Seminar • Health education	- Essaytype - Short answers - Objective type question - Assessment of skills with check list - Assessment of patient

		disordersof musculo skefetal system	dislocation,fracture,tumour and trauma ❑ OsteomalacianandOsteoporosis ❑ Arthritis ❑ Congenitaldeformities ❑ Spinal column – defects & deformities, Tumor, Prolapsed intervertebraldisc,pott'sspine ❑ Paget'sdisease • Amputation • Prosthesis • Transplant&replacement surgeries • Rehabilitation Specialtherapies,alternative therapies NursingproceduresDrugsu sedintreatmentof disordersofmusculoskeletalsystem	• Supervised clinical practice • Drug book/ presentation	managemen t problem
XI	10	Describethe etiology, pathophysi ology clinical manifestati ons, diagnostic measures and manageme nt of patients (adults including elderly) with disordersof immunolog icalsystem.	**Nursingmanagementofpatient (adultsincludingelderly)with Immunologicalproblems** • Reviewofimmunesystem ▮ NursingAssessment-History and Physical assessment ▮ Etiology,Pathophysiology, clinical manifestations, diagnosis, treatment modalities &medical,surgical,dietetics& nursing management of – ▮ Immunodeficiencydisorder ▮ Primaryimmuno deficiency ▮ Phagocyticdysfunction ▮ B-cellandT-celldeficiencies ▮ Secondaryimmuno-deficiencies ▮ Acquiredimmunodeficiency syndrome (AIDS) ▮ IncidenceofHIV&AIDS ▮ Epidemiology ▮ PreventionofTransmission ▮ StandardSafetyprecautions ▮ RolcofNurse,Counselling ▮ Healtheducationandhome care consideration ▮ National AIDS Control Program-NACO,various nationalandinternational agencies ▮ Infectioncontrolprogram ▮ Rehabilitation	• Lecture Discussion • Explain usingcharts, graphs, Models, films,slides • Demonstrati on • Practice session • Case discussions/ Seminar • Health education • Supervised clinical practice • Drug book/ presentation • Orientation visit to Hospital Infection Control System	- Essaytype - Short answers - Objective type question - Assessment of skills with check list - Assessment of patient managemen t problem

answers

-Objective type question

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			Special therapies, alternative therapies Nursing procedures Drugs used in treatment of disorders of immunological system		
XII	20	Describe the etiology, pathophysiology clinical manifestations, diagnostic measures and management of patients (adults including elderly) with Communicable Diseases	**Nursing management of patient (adults including elderly) with Communicable Diseases** • Overview of infectious disease, the infectious process • Nursing Assessment History and Physical assessment • Epidemiology, infectious process, clinical manifestations, diagnosis, treatment, prevention and dietetics • Control and eradication of common Communicable Diseases ❑ Tuberculosis ❑ Diarrhoeal diseases ❑ Hepatitis A-E ❑ Herpes ❑ Chickenpox ❑ Smallpox ❑ Typhoid ❑ Meningitis ❑ Gasgangrene ❑ Leprosy ❑ Dengue ❑ Plague ❑ Malaria ❑ Diptheria ❑ Pertussis ❑ Poliomyelitis ❑ Measles ❑ Mumps ❑ Influenza ❑ Tetanus ❑ Yellow fever ❑ Filariasis ❑ HIV,AIDS • Reproductive Tract Infections • Special Infection control measures - Notification, Isolation, Quarantine, Immunization, Infectious disease of hospitals, Special therapies, alternative therapies Nursing procedures Drugs used in treatment of Communicable diseases	• Lecture Discussion • Explain using charts, graphs, Models, films, slides • Demonstration • Practice session • Case discussions/ Seminar • Health education • Supervised clinical practice • Drug book/ presentation	Essay type Short answers Objective type Assessment of skills with check list Assessment of patient management problem

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XIII	25	Describe the organisation and physicalset up of Operation Theatre Identifythe various instruments and equipments used for common surgical procedures Describethe infection control measuresin the operation theatre Describe the role of thenursein the Peri-operative nursingcare	**Perioperativenursing:** • OrganisationandPhysicalset up of the Operation Theatre (O.T.) : ❑ Classifications ❑ O.T.Design ❑ Staffing ❑ MembersoftheOTteam ❑ Dutiesandresponsibilitiesof nurse in O.T. ❑ PrinciplesofHealthand operating room attire ❑ Instruments ❑ Sutures&suture materials ❑ Equipments ❑ O.T.tablesandsetsforcommon surgical procedures ❑ Positions and draping for commonsurgicalprocedures ❑ Scrubbingprocedures ❑ Gowningand gloving ❑ PreparationofO.T.Sets ❑ Monitoringthepatientduring surgical procedures • Maintenanceoftherapeutic environment in O.T • StandardSafetymeasures- ❑ Infectioncontrol:fumigation, disinfection and sterilisation ❑ Biomedicalwastemanagement ❑ Preventionofaccidentsand hazards in O.T. • Anaesthesia ❑ Types ❑ Methodsof administration ❑ EffectsandStages ❑ Equipments ❑ Drugs • CardioPulmonaryResuscitation (CPR) • Painmanagementtechniques • LegalAspects	• Lecture Discussion • Explain usingcharts, graphs, models, films,slides • Demonstration • Practice session • Case discussions /Seminar • Health education • Supervised clinical practice • Drugbook/ presentation	- Essaytype - Short answers - Objective type question - Assessment of skills with check list

P.B

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Jayesh Soneli

MedicalSurgicalNursing-IPractical

(AdultincludingGeriatrics)

Placement-SecondYear **Time-720 hours**

Areas	Duration (in week)	Objectives	Skills	Assignments	Assessment Methods
General Medical Ward (Respiratory, GI, Endocrine, Renal, Hemotology	6	• Provide nursingcare to adult patientswith medical disorders • Counseland educate patients and families	• Assessmentofthe patient ❑ Takinghistory ❑ Performgeneraland specific physical examination ❑ Identifyalterations and deviations • Practicemedical surgical asepsis standard safety measures • Administer medications ❑ Oral, IV, IM, Subcutaneous,IV therapy ❑ IVcanulation ❑ Maintenanceand monitoring • Oxygentherapyby different methods • Nebulization • Chestphysiotherapy • Nasogastric feeding • Assistincommon diagnostic • Perform/Assistin therapeutic procedures • Blood and componenttherapy • Throat Suctioning • Collectspecimens for common investigations • Maintain elimination ❑ Catheterisation ❑ Bowelwash ❑ Enema ❑ Urinary drainage • MaintainIntake,	• Assign3 - 4 patients forgiving planned nursing care • Prepare2 nursing care plan • 1 - Nursing case study &presentati on including drug • Maintaining drug book • Maintain practical record book	• Assess performance with rating scale • Assesseach skill with check list • Evaluationof casestudy / presentation • Completion of practical record

VIII	25	Describe	**Perioperativenursing:**	• Lecture	- Essaytype

			output and documentation • Counselandteach related to specific diseaseconditions		
General Surgical Ward (GI, Urinary, CTVS)	6	• Provide pre and post operative nursingcare to adult patientswith surgical disorders • Counseland educate patients and families	• Practicemedical surgical asepsis standard safety measures • Pre operative preparation of patients(alongwith drugs) • Postoperativecare-Receiving patient, assessment, monitoring care • Careofwoundsand drainage • Sutureremoval • Ambulationand exercise • Nasogastric aspiration • Careofchest drainage • Ostomycare : ▫ Gastrostomy ▫ Colostomy ▫ Enterostomy • Blood&component therapy • Practiceuniversal precautions	• Plan and givecare to 3 - 4 assigned patients • Nursing careplan-2 • Nursing case study / presentation – 1 • Maintain drug book	• Assess performance with rating scale • Assesseach skill with check list • Evaluationof casestudy / presentation • Completion of activity record
Cardiology ward	2	• Provide nursingcare to patients withcardiac disorders • Counseland educate patients and families	• Physical examinationof cardiovascular system • Recording and interpretingECG • Monitoringof patients • Preparation and assisting in non-invasive and invasivediagnostic procedures • Administercardiac drugs • Cardiopulmonary Resuscitation	• Plan and givecare to 2 - 3 assigned patients • Nursing careplan-1 • Nursing case study / presentation / Health talk– 1 • Maintain drug book	• Assess performance with rating scale • Assesseach skill with check list • Evaluationof casestudy / presentation /healthtalk • Completion of activity record

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			• Teachpatientsand families • Practicemedicaland surgical asepsis – Standard safety measures		
Skin &Com mu nicable diseases Ward	1	• Identifyskin problems • Provide nursingcare to patients with skin disorders &Communi ca blediseases • Counseland educate patients and families	• Assessment of patientswithskin disorders • Assistindiagnostic and therapeutic procedures • Administertopical medication • Practice medical surgicalasepsis– Standard safety measures • Use of personal protective equipment(PPE) • Givemedicated baths • CounsellingHIV positive patients • Teachpreventionof infectious diseases	• Plan and givecare to 2 - 3 assigned patients • Health talk / Counselli ng HIV positive patients and families– 1 • Maintain drug book	• Assess performance with rating scale • Evaluation healthtalk/ Counselling session • Completion of activity record
Orthopa edic ward	2	• Provide nursingcare to patients with musculo -skeletal disorders • Counseland educate patients and families	• Assessment of orthopaedicpatients • Assistinapplication of plaster cast and removal of cast • Applyskintraction- buck's extension traction • Assistinapplication and removal of prosthesis • Physiotherapy- Range of motion exercises(ROM), muscle strengthening exercises • Crutchmanoeuvring technique • Activitiesofdaily living • Ambulation • Teach and counsel patients&families	• Plan &give careto2- 3 assigned patients • Nursing careplan- 1 • Nursing case study / presentati on – 1 • Maintain drug book	• Assess performance with rating scale • Evaluation of nursing care plan & nursingcase study / presentation • Completion of activity record

P.P

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Operation Theatre	6	• Identify instruments used in common operations • Participate ininfection control practicesin the Operation Theatre • Set-up the table / trolleysfor common operative procedures • Assist in giving anaesthesia • Assistinthe operative procedures • Provide peri-operative nursingcare	• Scrubbing,gowning gloving • Identifyinstruments, suturing materials for common operations • Disinfection, Carbolization, fumigation • Preparation of instrument sets for commonoperations • Sterilization of sharpsandother instruments • PreparetheOTtable depending upon the operation • Positioningand monitoring of patients • Endotracheal intubation • Assistinginminor and major operations • Handlingspecimens • Disposalofwasteas per the guidelines	• Assist as a circulator ynursein * Major cases-10, * Minor cases–5 • Assistas a scrub nurse in * Major cases-10, * Minor cases–5 • Maintain drug book	• Assess performance with rating scale • Completion of activity record

Internship

Time-260hours(9 weeks)

Areas	Duration (in week)	Objectives	Skills	Assignments	Assessment Methods
ICU, CCU, Cardiac OT	2	• To gain proficiency in ICU nursing • Develop advanceskill in special procedures used in CriticalCare Unit • Identify potential problems andprovide care accordingly	• Assist in arterial punctureforblood gas analysis • Perform ECG and interpretaccordingly • Conduct&analyse pulse oximetry • Carewithartificial airway • Assist in endotracheal intubation • Settingup ventilator • Giving care to patientonventilator • Drugsheet • Observationof	• Arterial puncture –5 • Taking outECG strip–5 • Tracheal suction-5 • Oxygen administration by CPAP maskand useAmbu bag. • Assessm	• Recordbook • Checking with supervisor

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		• Skill in settingand handling ventilator • Administer injection using infusion pump • Record accurately findingsand medications • DevelopIPR with family members • Acquaint with OT technique	specialprocedurein OT.	ent for all assigned patients • Nursing care of patienton ventilator • Drug sheet	
Neuro ICU, ITU, OT	2	• Develop skill in neurological assessment • Givecareto the patient with head injury and spinalinjury • Care with chest surgeryand cranial surgery	• Assessneurological status • Implementcareto headinjury,spinal injury patients • Drugsheet • Pre and post operativecarewith neuro surgery patients	• Assessm ent for all assigned patients • Nursing care plan-2 • Drug sheet	• Recordbook • Observation checklist
Burns& plastic Re-construc tive surgery	2	• Assessthe severityof burns • Administer rehydration therapy • Observe re-constructive surgery	• Nursing care	-	-
OT Laparo scopic, Orthopa edic, Eye, ENT	3	• Identify instruments • AssistinOT set-up • Supervise sterilization • AssistinOT tablelayout • Observe immediately	-	• Assist-5 cases	• Recordbook

		• after operation • Supervise infection control			

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CommunityHealthNursing–I

Placement - Second Year

Time - Theory – 90 hours
Practical–135hours

Course Description -This course is designed for students to appreciate the principles of promotion and maintenance of health.

Unit	Time (Hrs)	Learning Objectives	Content	Teaching Learning Activities	Assessment Methods
I	2	Describe conceptand dimensions of health	**Introduction:** • Communityhealthnursing • Definition,conceptand dimensions of health • Promotionofhealth • Maintenanceofhealth	• Lecture Discussion	- Short Answers
II	20	Describe determinant s of health	**Determinantsofhealth:** • Eugenics • Environment- ❑ Physical - Air, Light, Ventilation,Water,Housing, ❑ Sanitation:Disposalofwaste, Disposal of dead bodies ❑ Forestation,Noise,Climate ❑ Communication-Infrastructure facilities and Linkages ❑ Actsregulatingtheenvironment -NationalPollutionControl Board ❑ Bacterial&Viral-Agents,host, carriers and immunity ❑ Arthopodsand Rodents • Foodhygiene-Production, Preservation, Purchase, Preparation, Consumption • Acts regulating food hygiene - PreventionofFoodAdulteration Act, Drugs & Cosmetic Act • Socio-cultural- ❑ Customs,taboos ❑ Marriage system ❑ Family structure ❑ Status of special groups : Females, Children, Elderly, ChallengedgroupsandSick persons • LifeStyle • Hygiene • Physicalactivity- ❑ Recreationandsleep	• Lecture discussion • Explain using Charts, graphs, Models, films,slides • Visits to water supply, sewage disposal, milkplants, slaughter house etc	- Essaytype - Short answers - Objective type

			▫ Sexuallife ▫ Spiritual,Lifephilosophy ▫ Selfreliance ▫ Dietary pattern ▫ Education ▫ Occupation • FinancialManagement- ▫ Income ▫ Budget ▫ Purchasingpower ▫ Security		
III	10	Describe concept, scope,uses, methods and approaches of epidemiology	**Epidemiology:** • Definition, concept, aims, scope,usesandterminology used in epidemiology • Dynamics of disease transmission-Epidemiological triad • MorbidityandMortality-measurements • Levelsofprevention • Methodsofepidemiologyof- ▫ Descriptive ▫ Analytical-Epidemic Investigation ▫ Experimental	• Lecture discussion • Explain using Charts, graphs, Models, films,slides	- Essaytype - Short answers
IV	25	Describe Epidemiology and nursing management of common Communicable diseases	**Epidemiologyandnursing management of common Communicable Diseases :** • Respiratoryinfections- ▫ SmallPox ▫ Chicken Pox ▫ Measles ▫ Influenza ▫ Rubella ▫ ARI's&Pneumonia ▫ Mumps ▫ Diphtheria ▫ Whoopingcough ▫ Meningococcalmeningitis ▫ Tuberculosis ▫ S.A.R.S. • IntestinalInfections- ▫ Poliomyelitis ▫ ViralHepatitis ▫ Cholera ▫ Diarrhoealdiseases ▫ TyphoidFever ▫ Foodpoisoning ▫ Amoebiasis ▫ Hookworm infection ▫ Ascariasis	• Lecture discussion • Explain using Charts, graphs, Models, films,slides • Seminar • Supervised field practice - health centers, clinicsand homes • Group projects/ Health education	- Essaytype - Short answers - Objective type

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			❑ Dracunculiasis • Arthropodinfections- ❑ Dengue ❑ Malaria ❑ Filariasis • Zoonoses ***Viral-*** ❑ Rabies ❑ Yellow fever ❑ Japaneseencephalitis ❑ KyasnurForest Disease ***Bacterial-*** ❑ Brucellosis ❑ Plague ❑ HumanSalmonellosis ❑ Anthrax ❑ Leptospirosis ***Rickettsialdiseases-*** ❑ RickettsialZoonoses ❑ Scrubtyphus ❑ Murinetyphus ❑ Ticktyphus ❑ Q fever ***Parasiticzoonoses-*** ❑ Taeniasis ❑ Hydatiddisease ❑ Leishmaniasis ***Surfaceinfection-*** ❑ Trachoma ❑ Tetanus ❑ Leprosy ❑ STD&RTI ❑ Yaws ❑ HIV/AIDS Anyother		
V	10	Describe Epidemiology and nursing management of common Non communicablediseases	**Epidemiologyandnursing management of Non - communicable diseases :** • Malnutrition-undernutrition, over nutrition, nutritional deficiencies • Anaemia • Hypertension • Stroke • RheumaticHeartDisease • CoronaryHeartDisease • Cancer • Diabetesmellitus • Blindness • Accidents • Mentalillness • Obesity	• Lecture discussion • Explain using Charts, graphs, Models, films,slides • Seminar • Supervised field practice - health centers, clinicsand homes • Group	- Essaytype - Short answers - Objective type

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			• Iodinedeficiency • Fluorosis • Epilepsy	projects/ Health education	
VI	6	Describe the concepts & scope of Demography Describe methods of data collection, analysis &interpretation of demographic data	**Demography:** • Definition,conceptandscope • Methods of collection, analysis &interpretationofdemographic data • Demographicratesandratios	• Lecture discussion • Community identification survey	- Essaytype - Short answers - Objective type - Assessment of survey report
VII	17	Identifythe impact of population explosion in India Describe methodsof population control	**Populationanditscontrol:** • Populationexplosionandits impact on social, economic development of individual, society and country • Populationcontrol- ❑ Over all development- Women empowerment,social,economic and educational development • Limitingfamilysize: ❑ Promotionofsmallfamilynorm ❑ Methods-spacing(natural, biological, chemical, mechanical methods, etc) ❑ Terminal-surgicalmethods ❑ Emergencycontraception	• Lecture discussion • Population survey • Counselling • Demonstration • Practice session • Supervised field practice	- Essaytype - Short answers - Objective type - Assessment of survey report

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CommunityHealthNursingI– Practical

Placement-SecondYear

Time-Practical–135 hours

Areas	Duration (in week)	Objectives	Skills	Assignments	Assessment methods
Community health nursing	2wks urban and 2 wks rural	• Buildand Maintain rapport • Identify demographic characteristics, health determinants &community health resources • Diagnose health needs ofindividual and families • Provide primarycare in health centre • Counsel &educate individual, family &community	• Usetechniquesof inter-personal relationship • Identification of healthdeterminants of community • Historytaking • Physical examination • Collectspecimens-sputum, malaria smear • Performsimplelab tests at centre - blood for Haemoglobin and sugar, urine for albumin & sugar • Administervaccines and medications to adults • Counselandteach individual, family and community □ Nutrition □ Hygiene □ Selfhealth monitoring □ Seekinghealth services □ Healthylifestyle □ Familywelfare methods □ Healthpromotion	• Towork with 2 assigned families each in urban&rural • Family study–1 • Observationreport of community– 1 • Health talks-2 (1 in urban& 1 in rural)	• Assess clinical performance with rating scale • Assesseach skill with checklist • Evaluation of family study, observation report and health talk • Completion of activity record

Communication&EducationalTechnology

Time-Theory–90hours

Placement-SecondYear

Course Description - This course is designed to help the students acquire an understanding of the principles and methods of communication and teaching. It helps to develop skill in communicating effectively, maintaining effective interpersonal relations, teaching individuals and group in clinical, community health and educational settings.

Unit	Time (Hrs) Th.	Pr.	Learning Objectives	Content	Teaching Learning Activities	Assessment Methods
I	5		Describethe communicationprocess Identify techniques ofeffective communication	**ReviewofCommunication Process :** • Process:elementsand channel • Facilitators • Barriersandmethodsof overcoming • Techniques	• Lecture Discussion • Roleplays • Exercises withaudio/ video tapes	- Respond to critical incidents - Short answers - Objectives type
II	5		Establish effective interpersonalrelations with patients families &co-workers	**Interpersonalrelations:** • Purpose&types • Phases • Barriers&methodsof overcoming • JohariWindow	• Lecture Discussion • Roleplays • Exercises with audio/video tapes • Process recording	- Short answers - Objectives type
III	5		Develop effective human relationsin context of nursing	**Humanrelations:** • Understandingself • Social behaviour, motivation,socialattitudes • Groups&Individual • Humanrelationsincontext of nursing • Group dynamics • Teamwork	• Lecture Discussion • Sociometry • Group games • Psychometric exercises followed by discussion	- Short answers - Objectives type - Respond to critical incidents
IV	10	5	Develop basic skill of counselling and guidance	**Guidance&counselling:** • Definition • Purpose,scope&need • Basicprinciples • Organizationofcounselling services • Typesofcounselling approaches • Roleandpreparationof counsellor	• Lecture Discussion • Role play on counselling in different situations followedby discussion	- Short answers - Objectives type - Assess performance in role play situations

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				• Printedaids-pamphlets&leaflets • Projected aids - slides, overheadprojector,films, TV,VCR/VCD,camera, microscope, LCD • Audioaids-tapercecorder public address system • Computer		
VIII	5	7	Prepare different types of questions for assessment of knowledge, skills and attitudes	**Assessment:** • Purpose & scope of evaluation&assessment • Criteria for selection of assessmenttechniquesand methods • Assessmentofknowledge-Essaytypequestions,Short answer questions (SAQ), Multiple choice questions (MCQ) • Assessmentofskills-observationchecklist, practical exam, Viva, Objective structured clinical examination (OSCE) • AssessmentofAttitudes-Attitude scales	• Lecture Discussion • Exerciseon writing different types of assessment tools	- Short answers - Objectives type - Assessthe strategies used in practice teaching sessionsand exercise sessions.
IX	5		Teach individuals, groups and communities about health with their active participation	**Information,Education& Communicationforhealth (IEC) :** • Healthbehaviour&health education, Planning for health education • Healtheducationwith individuals,groups&communities • Communicatinghealth messages • Methods & media for communicatinghealth messages,Usingmass media	• Lecture Discussion • Plan &conduct health education sessionsfor individuals, group &communities	- Short answers - Objectives type - Assessthe planning& conduct of the educational session.

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				• Issuesforcounsellingin nursing - students and practitioners • Counsellingprocess-steps & techniques, tools of counsellor • Managingdisciplinary problems • Managementofcrisis&r eferral		
V	5		Describe the philosophy &principle s of education Explainthe teaching learning process	**Principles of education & Teachinglearningprocess:** • Education - meaning, philosophy,aims,functions & principles • Natureandcharacteristics of learning • Principlesandmaximsof teaching • Formulatingobjectives-general and specific • Lessonplanning • Classroommanagement	• Lecture Discussion • Prepare lessonplan • Micro teaching • Exerciseon writing objectives	- Short answers - Objectives type - Assess lessonplans & teaching sessions
VI	10	10	Demonstrat e teaching skill using various teaching methods in clinical, classroom &communi ty settings	**Methodsofteaching:** • Lecture, demonstration, group discussion, seminar, symposium, panel discussion, role play, project, field trip, workshop, exhibition, programmed instruction, computerassistedlearning, micro teaching, problem based learning, Self instructional module and simulation, etc. • Clinicalteachingmethods-casemethod,nursinground & reports, bedside clinic, conference (individual & group), process recording	• Lecture Discussion • Conduct 5 teaching sessions using different methods& media	- Short answers - Objectives type - Assess teaching sessions
VII	10	8	Prepareand usedifferent types of educational media effectively	**Educationalmedia:** • Purposes&typesofA.V. Aids, principles and sources, etc. • Graphicaids-chalkboard, chart, graph, poster, flash cards,flannel graph, bulletin, cartoon • Three dimensional aids - objects,specimens,models, puppets	• Lecture Discussion • Demonstrati on • Prepare different teaching aids - projected& non projected	- Short answers - Objectives type - Assessthe prepared teaching aids.

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BOS

BACHELOR OF ARCHITECTU

5 Year

2019-2020

Semesters-X

All Semester Details

SYLLABUS-BACHELOR OF ARCHITECTU

5 years Bachelors of Architecture

Semester I

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33000001	Foundation Studio	15	0	6	8	15
33010101	Building Material and Construction-I	6	2	2	2	6
33010102	Technical Representation of Drawings-I	3	1	0	2	3
33010103	Humanities	2	2	0	0	2
33000002	Design Communication	2	1	0	1	2
23000007	Introduction to Entrepreneurship	2.5	2	1	0	3

Semester II

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33010201	Architecture Design - I	12	0	6	6	12
33010202	Building Material & Construction - II	6	2	2	2	6
33010203	Technical Representation of Drawings - II	3	1	0	2	3
33010204	Structure - I	2	2	0	0	2
33010205	Basic of Design	3	1	0	2	2
33010206	History of Architecture - I	2	2	0	0	2
23000013	Preparing Wider Horizon for Entrepreneurship	2.5	2	1	0	3

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Semester III

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33040301	Architecture Design - II	12	0	6	6	12
33040302	Building Material & Construction - III	6	2	2	2	6
33040303	Structure - II	4	0	0	2	4
33040304	Environment Science & Services - I	2	0	0	2	2
33040305	History of Architecture - II	2	0	0	2	2
33040306	Computer Applications - I	4	0	2	2	4
23000014	Entrepreneur Motivation	2.5	2	1	0	3

Semester IV

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33010401	Architecture Design - III	12	0	6	6	12
33010402	Building Material & Construction - IV	6	2	2	2	6
33010403	Structure - III	2	2	0	2	2
33010404	Environment Science & Services - II	2	0	0	2	2
33010405	History of Architecture - III	2	2	0	0	2
33010406	Computer Application - II	4	0	2	2	4
23000017	Project feasibility and marketing skills	2.5	2	1	0	3

Semester V

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33010501	Architecture Design - IV Building	12	0	6	6	12
33010502	Material & Construction - V	6	2	2	2	6
33010503	Structure - IV Environment Science &	2	2	0	0	2
33010504	Services - III History of Architecture -	2	2	0	0	2
33010505	IV Computer Applications - III Scaling	2	2	0	0	2
33010506	up the Venture	4	0	2	2	4
23000020		2.5	2	1	0	3

Semester VI

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33010601	Architecture Design - V	12	0	6	6	12
33010602	Building Material & Construction - VI	6	2	2	2	6
33010603	Structure - V	2	2	0	0	4
33010604	Environment Science & Services - IV	2	2	0	0	2
33010605	History of Architecture - V	2	2	0	0	2
33010606	Computer Applications - IV	4	0	2	2	4
23000021	Idea to Minimum Viable Product	2.5	2	1	0	3

Semester VII

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33010701	Internship/Office training	30	0	0	30	30

Semester VIII

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33010801	Architecture Design - VI	14	0	7	7	14
33010802	Theory of Architecture	4	2	0	2	4
33010803	Site Planning	4	2	0	2	4
33010804	Design Seminar - I	4	2	0	2	4
33010805	Elective I	2	1	1	0	2
23000024	Subject from School of IE	2.5	2	1	0	3

SWARRNIM STARTUP AND INNOVATION UNIVEI

Bachelor of Architecture- Semester IX, 2019-20

TEACHING AND EVALUATION SCH

Week wise Time table: The subject and the time table are divided week wise. Timetables are created based on subject credits. Teaching and lectures are conducted based on the time table having contact hours of 30 hrs per week.

Module Based: Courses conducted in modular format allows students a benefit to go deeper with their studies, skills or research and get continuous support to improve on to each subject. They get more time to focus on every aspect of the subject and the course. They get regular Faculty guidance throughout the module and can plan their activities and assignment without getting affected of any other course.

Course Categories –

Skill/Workshop

Where faculty members coach students to help them develop skills in working with certain materials and technologies.

- To encourage Interactive and hands-on learning
- To provide sufficient time for skill building;
- To develop practical reasoning and decision-making skills.

Studio

Where students are confronted by life-like situations and told to define the problems and to attempt solving them. The faculty coaches students and provides them with necessary concepts and theories.

- To encourage individual but active learning and responsibility
- To facilitate learning to work with group dynamics.

Lecture/Theory

Lectures are the primary mode of teaching. Best suited for transferring information/concepts/theory. Should be supplemented by frequent tests to verify whether concepts are being understood.

- To deliver substantial amounts of information to student
- To provide a summary or synthesis of information from different sources
- To allow introduction of multiple concepts

Internship

Where a student apprentices in an office or a site to experience what it is like to work in a real-life situation

- To develop that self-confidence of the student
- To expose students to different types of work and comprehensive work experience essential for the independent practice of profession.

Guided Thesis/ Research

Where faculty members coach individual students on conducting research and writing up the results, undertaking research for a design project and writing up the results or, conducting research for proposing a development project and writing up a grant proposal.

- To equip students with vital research skills.
- To build capacity to develop logical and independent thought process.

Examinations

The Examinations conducted as per the subject criteria. The subjects having external component may have written examination / viva based on the subject details. Studio, workshops and skill based subjects will have critique jury at the end of semester. For Juries, students are required to present and display their real work, prototypes, documentation, explorations etc. done during the semester. Students are evaluated, Judged and guided by field experts of 2 to 4 members as Jury panel. They are given 30 to 45 minutes to speak and discuss in front of the Jury panel regarding their work, learning and improvements during attending the semester courses. The Students who fail to attend Juries as per their Jury Panel decided by the examination committee are subject to fail and repeat the entire Semester or a year.

Skill Course Evaluation Criteria:

SWARRNIM STARTUP AND INNOVATION UNIVERSITY

BACHELOR OF ARCHITCTURE – COURSE DETAILS

SEMESTER I

Year 2019-20

Semester 1

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33000001	Foundation Studio	15	0	6	8	15
2	33010101	Building Material and Construction - I	6	2	2	2	6
3	33010102	Technical Representation of Drawings - I	3	1	0	2	3
4	33010103	Humanities	2	2	0	0	2
5	33000002	Design Communication	2	1	0	1	2
6	23000007	Introduction to Entrepreneurship	2.5	2	1	0	3
Total			**30.5**	**8**	**9**	**13**	**31**

Subject Name	Credit	Internal				External				Total
		TH	P	PR	P	TH	P	PR	P	
Foundation Studio	15	0	0	50	25	0	0	50	25	100
Building Material and Construction - I	6	25	12.5	25	12.5	50	25	0	0	100
Technical Representation of Drawings - I	3	0	0	50	25	50	25	0	0	100
Humanities	2	50	25	0	0	50	25	0	0	100
Design Communication	2	0	0	50	25	0	0	50	25	100
Introduction to Entrepreneurship	2.5	0	0	50	25	0	0	50	25	100
Total	**30.5**	**75**		**225**		**150**		**150**		**600**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

Semester: I
Subject: Foundation Studic

Course Code: 33000001
Credits: 15

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	6	8	15

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Relevance:

This course helps develop a quality of keen observation and experience space in terms of perspective. Sharpen the ability to analyze and appreciate the structure that is either visible or hidden, understanding the underlying principles of design, develop fundamental and expert skills required for design representation in 2D and 3D. Helps establish sense of inter-relatedness of parts in overall proportion, colour, and composition to develop a sense of aesthetics.

Objective:

1. To observe and represent images, ideas, concepts and ability.
2. To develop an ability to visualize and articulate one's thinking process.
3. To improve coordination of eye and hand
4. Seek out, observe and analyze occurrences of Geometry in the world

Content:

1. Understanding visual perception of forms analyzed through spatial elements like, line, plane and volume through graphic tools using 2D and 3D explorations.
2. Design principles- Principles of organization & composition , Scale, Proportion, Dimensions, Light, Vision, Perception, Volumes, Materials, Textures
3. Freehand Sketching & drawing representation techniques – Perspectives, Isometric views, humans, Imaginative drawing etc.
4. Gestalt theory using elements of design
5. Science & Concept of colour and colour wheel. Colour perception & human responses, colour in design principles. Colour interaction as a phenomenon, Colour and Form relationshio
6. Using elements of design to understand order in space and form, Variation, issues of geometry, principles of perception, proximity, and closure similarity form in content, figure and ground relationships, etc.
7. Relationship between plane and form – Developing 3D solids, Origami etc.

Methodology:

1. Concepts through lectures and demonstrations.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Group presentations, discussions and critiques.

Learning Outcome:

Students will learn the Basics of Drawing with Observation to nature and
Form. At the end of this course they should be able represent their ideas on paper constructively.

Book Recommended:

1. Form, Space and Order – D.K.Ching
2. Elements of Space Making- Yatin Pandya
3. Operative Design: A Catalogue of Spatial Verbs- Mari, Anthony Di
4. Conditional Design: An Introduction to Elemental Architecture- Mari, Anthony Di
5. Thinking Visually for Illustrators – Mark Vigan
6. Design as Art – Bruno Manarai
7. Geometry of Design: Studies in Proportion and Composition – Kimberly Elam
8. Universal Principles of Design

E-Sources key words:

Semester: I
Subject: Building Material and Construction

Course Code: 33010101
Credits: 6

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	2	6

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
25	12.5	25	12.5	50	25	--	--

Relevance:

An important part of interior design is the specification of suitable materials for the various components that make up a particular interior space. Using environmentally preferable interior materials is an important issue, to reduce the flow of non-renewable resources into interior materials and pollutants from interior materials throughout life cycle of interior materials.

Objective:

1. To get acquainted with basic building materials.
2. To understand basic building materials and construction techniques .
3. To learn regarding various natural building materials, its origins, manufacturing, construction techniques.

Content:

1. Introduction of materials – their physical and behavioral properties, methods, tools of application, different construction technique and criteria for selection of material based on design etc.
2. Understanding of construction fundamentals of all natural building construction materials: Eg. Mud, Brick, Stone, and Bamboo.
    a. Visual quality of all the materials in terms of texture, colour and patterns.
    b. Material strength, longevity, maintenance
    c. Material processing
3. Construction Techniques based on the material (learning through doing)
4. Rational choice for material selection – parameters of design aspects of using various materials in construction of different elements of construction system in relation to the properties of materials.
5. Study of different building elements, structure and their behavior.

Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Case Studies
6. Industrial Visits
7. Market Surveys

Book Recommended:

1. Building Construction W.B. Mckay
2. Building Material and Construction – BC Punamia
3. Building Materials SK Duggal
4. The Art of Earth Architecture: Past, Present, Future – Jean Dethier
5. Building with Bamboo: A Handbook: Janssen, Jules J.A
6. The Art of Natural Building: Design, Construction, Resource by Joseph E. Kennedy (Editor), Michael G. Smith (Editor), Catherine Wanek (Editor)'
7. House of Earth: A complete handbook for earthen construction – Conrad Rouge
8. House, Form and Culture – Amos Rappoport

E-Sources key words:

Semester: I
Subject: Technical Representation of Drawings

Course Code: 33010102
Credits: 3

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
1	0	2	3

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	50	25	--	--

Relevance:

Creating technical drawings is one of the fundamental skills required for an interior designer. Learning to create accurate technical drawings as well as various representation techniques to create visually appealing drawings is the fundamental objective of this subject. The subject will help student to improve their drawing skill and abilities, and improve different techniques of various methods of drawing. Students will lean the ability to communicate through drawings.

Objective:

Developing Drawing skill as tools for design thinking and expression. To help students and understand the techniques of various methods of drawing.

Content:

1. Familiarization of equipment and recapitulation: Ability to handle and use various drawing instruments and media for technical drawing as representation techniques.
2. Line types; meaning and application, lettering , use of various metric scales, conventions ,standard annotations and format.
3. Lettering: single stroke, double stroke, vertical/ inclined, capital letters, and inclined letters. Dimensioning.
4. Understanding scales: study of scales, their use in practice and construction of plain and diagonal scale. Concept of enlargement and reduction of objects.
5. Understanding of geometrical drawing, Orthogonal projection, projection of lines, planes and solids, section of primary solids such as pyramid, cones, cylinder, prism, sphere, cuboids, etc.
6. Development of geometric objects and their surface development. Model making using two dimensional materials like paper etc.
7. Various representation techniques using various mediums to represent various interior, architectural and natural elements.

Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio hands on
3. Hand Drafted and Hand-Crafted assignments
4. Practical assignments both at an individual and group level.

Book Recommended:

1. Design drawing – Francis D.K.Ching (with Steven P. Juroszek)
2. Architectural Graphics – Francis D.K.Ching
3. Interior Graphic Standard – Corky Binggel, Asid.

E-Sources key words:

Semester: I
Subject: Humanities

Course Code: 33010103
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

Study of man and his culture to form derivation in the contemporary world, study the formalization of a civilized state through a long collective human experience.

Content:

1. Study the Ancient World through its History, Art, Religion, Culture, anthropology, philosophy, etc. To earmark culture landmark responsible for shaping our surrounding.
2. Introduction of society, basic concept of society-group, community (rural and urban), association, institution.
3. Study of Medieval and Modern times to understand the culture development through the ages.

Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Group presentations, discussions, debates and critiques.

Book Recommended:

1. Glimpse of world history
2. Ascent of man- J.Bronoski
3. Humanities through eras- Philip Soergel
4. An introduction to sociology- Vidhya Bhushan and D. R. Sachdeva
5. Indian Society and Culture – Continuity and change by Nadeem Husain
6. House, Form and Culture – Amos Rappoport

E-Sources key words:

Semester: I
Subject: Design Communicatio

Course Code: 33000002
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
1	0	1	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Relevance:

The University acknowledges English as the primary oral and written language for communication. Design communication refers to the ability of designers to communicate various design concepts, abstract thoughts, design processes etc - clearly, using oral, written, and non-verbal languages

Objective:

1. Being able to effectively communicate in a simple and understandable manner
2. Sharing ideas and information on design for designers as well as clients
3. Being able to discuss various ongoing concepts tangible as well as intangible, physical as well as abstract.
4. Practicing defending design which will enable them to communicate better during their design juries.

Content:

The course content may contain the following processes, although the design communication content is not limited to the listed content below

1. Describing Objects
2. Imagining Worlds
3. Describing Design
4. Photo-essays
5. Descriptive Essays
6. Argumentative Essays
7. Designing Games
8. Ideating and creating solutions to various issues
9. Startup ideas

Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Group presentations, discussions, debates and critiques.

Book Recommended:

1. Articulating Design Decisions: Communicate with Stakeholders, Keep Your Sanity, and Deliver the Best User Experience Book by Tom Greever
2. Advanced English Grammar -Martin Hewings
3. English Grammar in Use – Tom Gibbons
4. Oxford Modern English Grammar- Bas Arts

E-Sources key words:

SWARRNIM STARTUP AND INNOVATION UNIVERSITY

BACHELOR OF ARCHITECTURE – COURSE DETAILS

SEMESTER II

Year 2019-20

Semester 2

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33010201	Architecture Design-I	12	0	6	6	12
2	33010202	Building Material & Construction II	6	2	2	2	6
3	33010203	Technical Representation of Drawings-II	3	1	0	2	3
4	33010204	Structure-I	2	2	0	0	2
5	33010205	Basic of Design	3	1	0	2	3
6	33010206	History of Architecture-I	2	2	0	0	2
7	23000013	Preparing Wider Horizon for Entrepreneurship	2.5	2	1	0	3
Total			**30.5**	**10**	**9**	**12**	**31**

Subject Name	Credit	Internal				External				Total
		TH	P	PR	P	TH	P	PR	P	
Architecture Design- I	12	0	0	50	25	0	0	50	25	100
Building Material & Construction-II	6	25	12.5	25	12.5	50	25	0	0	100
Technical Representation of Drawings-II	3	0	0	50	25	50	25	0	0	100
Structure I	2	50	25	0	0	50	25	0	0	100
Basic of Design	3	0	0	50	25	0	0	50	25	100
History of Architecture-I	2	50	25	0	0	50	25	0	0	100
Preparing Wider Horizon for Entrepreneurship	2.5	0	0	50	25	0	0	50	25	100
Total	**30.5**	**125**		**225**		**200**		**150**		**700**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

Semester: II
Subject: Architecture Design

Course Code: 33010201
Credits: 12

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	6	6	12

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

To Study space, form and design process.

Content:

1. Principles and Elements of Design.
2. Applications of basics of design in Architecture.
3. Spatial configuration and human anthropometry in Architecture.
4. Building appraisal.
5. Small Project: Understanding and implications of principles and elements of design in Architectural Design.

Methodology:

The objectives will be fulfilled by giving exercises to the students in different contexts, which will be presented in the 2D drawing form.

1. Study anthropometry which will also include dimensions of various activities taking place in everyday life.
2. Man and his basic living activity. Students will measure draw any day-to-day activity, study relative proportions and arrive with a design of (2D) functional usable space.

Learning Outcome:

The in-depth learning of principles of design and the development of skills to express their thought, with respect to mediums given. Reconditioning and reorienting them to design thinking, leading to a creative process towards any given problem.

Books Recommended

1. Josef albers : to open eyes, frederick a. Horowitz and brenda danilowitz, phaidon press, 2009.
2. Goethe's colour theory, goethe, johann wolfgang von, 1749-1832; goethe, johann wolfgang von, 1749-1832. Zur farbenlehre. English. 1971.
3. Shelter, lloyd kahn, shelter publications inc.,u.s; 2nd revised edition edition (2000)
Form, space and order, frank d. K. Ching, van nostrand reinhold; 2nd edition (1996)
· Universal principle of design, lidwell, william, kritina holden, jill butler, kimberly elam,2010
4
·
5

E-Sources key words

.

Semester: II
Subject: Building Material and Construction

Course Code: 33010202
Credits: 6

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	2	6

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
25	12.5	25	12.5	50	25	--	--

Objective:

Introduction to traditional building materials and their use in construction of Buildings.

Content:

1. Understanding brick and stone as a building material- its failure and behavior, stone extraction and dressing of stone through different tools and method of manufacturing brick and their Classification.
2. Construction techniques- traditional and modern, Introduction to Load bearing and Frame structure, Method of construction, types of masonry of stone and brick bonds- L and T junctions, typical wall section, foundation.
3. Construction of walls, floors, arches, dome and vaults, stairs through brick and stone.
4. Dry masonry and joinery of stone, pointing, Mortars like lime and cement used for construction of masonry structure.

Methodology:

Lecture based on theory and class assignments, making drawings, sketches and models. The students will be encouraged to do case studies and industrial site visits for the same.

LEARNING OUTCOME:

The students will have an understanding of aforementioned materials (Brick & stone) and their behavioral properties, and different methods and construction techniques. The students will also have a basic understanding of parameters of design aspects of using different materials in construction and elements of construction system in relation to the properties of materials.

Book Recommended:

1. Ching, D.K. Form, Space and Order
2. Fredrick, Matthew. 101 Thing I Learnt In Architecture
3. Ching, D.K. Illustration of Building and Construction
4. Rangwala S.C. Building Construction
5. Bindra S.P. Building Construction
6. Mackay W.B. Building Construction

E-Sources key words:

Semester: II
Subject: Technical Representation of Drawing

Course Code: 33010203
Credits: 3

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
1	0	2	3

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	50	25	--	--

Objective:

To develop an understanding of technical drawing skill as a tool for design communication.
To understand the various techniques and methods of drawing.

Content:

1. Scales and Geometrical Constructions
2. Orthographic Projections
3. Projections and sections of Solids
4. Development and Intersections of Surfaces
5. Isometric Projections
6. Helical Curves – Ellipse, Parabola, Hyperbola
7. Helical Staircase – Spiral staircase
8. Oblique and Perspective Projections
9. Orthographic Views and Sciography

Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio hands on
3. Hand Drafted and Hand-Crafted assignments
4. Practical assignments both at an individual and group level.

Learning Outcome:

The students will improve their understanding of technical drawing, drawing skill and abilities, and improve different techniques and methods of drawing. Students will learn the ability to communicate through drawings.

Book Recommended:

1. Bhatt, N.D. Engineering Drawing
2. Hoelscher and Springer. Engineering Drawing and Geometry
3. Ching, D.K. Francis, Juroszek, P. Steven. Design Drawing
4. Ching, D.K. Francis. Architectural Graphics
5. Gill, W. Robert. Perspective
6. Binggeli C. Interior Graphic Standard

E-Sources key words:

1. Technical Drawing & Design, *Gerald Wicks, Hulton Educational Publications Ltd. 1970.*

2. The Art of Drawing People, Walter Foster, Walter Foster Publications. INC. 2011. https://archive.org/details/TheArtOfDrawingPeople **Topics covered**: Basic Sketching, Human Figures, Anatomy, Basic Perspective, Rendering Techniques, Colouring and media exploration.

Semester: II
Subject: Structure I

Course Code: 33010204
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

To understand behaviour of structure.
To understand types of support condition.

Content:

1. Strength of Materials
2. Stress and Strain
3. Shear Force and Bending Moment
4. Types of Supporting Condition – Cantilevered, Hinged, Continuous, Fixed
5. Roof Spanning Systems – Trusses, Domes, Vaults, Arches
6. Foundation – Types & Behavior

Methodology:

Understanding structural performance of different material & different structural loads & its impact on building.

LEARNING OUTCOM

1.Explanation on different types of beams and loads applied on structures, types of supports and support conditions during the analysis, the use of truss, arches, domes and vaults in architecture through lecture and presentation.

2. Analysis of fixed and continuous beams. Also, analysis of continuous beams up to four spans, truss by method of joints, arches up to horizontal thrust, shear force and bending moment diagrams through classroom exercises.

3. Explanation on different types of foundation and load applied on them, the use of foundation in architecture through sketches and presentation.

Book Recommended:

1. Why Buildings stand up, Mario Salvadori, W. W. Norton & Company; Reissue edition (16 January 1991)
2. Why Buildings Fall Down – How Structures Fail, Matthys Levy (Author), Mario Salvadori, W. W. Norton & Company; Reprint edition (1 September 1994).
3. Strength of Materials: Elementary Theory and Problems - Vol. I by S. Timoshenko, Published by CBS; 3 editions (1 December 2004).
4. Structure in Architecture by Henry Cowhan
5. Strength of Material: R.S. Khurmi
6. Mechanics of Solids: H.J. Shah
7. Building Construction Illustrated by Francis D.K. Ching

E-Sources key words:

Semester: II
Subject: Basic of Desig

Course Code: 33010205
Credits: 3

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
1	0	2	3

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

1. To develop observational and creative skills that would enhance the visual perception of students and evolve aesthetic sensitivity.
2. To develop the perceptions of using the basic principles of aesthetics with the help of various medium, which can be useful in creating a built form.

Content:

1. Exploration of form: organization and transformation of shapes and form.
2. Exploration of various techniques: translation, aggregation and combination of shapes and
3. forms.
4. The study and application of anthropometry and ergonomics
5. Various Figures - Ground Relationships.

Methodology:

The theory lectures will be represented through a series of graphical exercises viz. exploring different media, compositions through models and use of different materials to express the perception.

Learning Outcome:

The students will learn how to organise shapes, forms as per basic principles of design, will learn how to transform a shape into a form, or a shape into another shape, or a form into another form. They will also learn how to add, subtract, merge, stack, combine, and intersect different volumes/forms. Along with the shapes and forms, the students will learn the color theory, how to integrate colors with shapes and or forms, how to balance/harmonize colors with shapes/forms.

Book Recommended:

1. Mari, Anthony Di. Operative Design: A Catalogue of Spatial Verbs.
2. Mari, Anthony Di. Conditional Design: An Introduction to Elemental Architecture
3. Heller, Steven. The Graphic Design Idea Book: Inspiration from 50 Masters
4. Barrat, Krome. Logic and Design
5. Ching, D.K. Form, Space and Order
6. Munari, Bruno. Design as Art

E-Sources key words:

Semester: II
Subject: History of Architecture

Course Code: 33010206
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

1. To understand the Architectural Elements, Stylistic features, Symbolism, and Concepts of
2. Space in the Indian Architecture.
3. To Study ancient civilizations and their development.

Content:

1. Development of various architectural styles with reference to the influencing factors such as
    1. Geographical, climatic, religious social and political conditions.
    2. Prehistoric Architecture
    3. Egyptian Architecture
    4. Mesopotamian, Chinese, Japanese, Roman, Greek
    5. Indus valley , south east civilization, African civilizations
2. History of architecture to be studied as history of development of building forms, ornamentation, structural solutions, construction methods, plans and building façades.
   To understand the trade route in Indian subcontinent and its influence in Indian architecture.
   To observe and understand the influence of non-physical parameters such as politics, culture, religion, tradition etc. in architecture.
3. Sacred Architecture of Indian Subcontinent (Hindu, Buddhist and Jain).
   The Buddhist Period in India and its Monuments including Rock cut Buddhist Chaitya Halls, Viharas and Stupas built in masonry.
4. Early temple forms derived after the decline of the Mauryan dynasty in India.

Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Group presentations, discussions, debates and critiques.

Book Recommended:

1. Glimpse of world history
2. Ascent of man- J.Bronoski
3. Humanities through eras- Philip Soergel
4. An introduction to sociology- Vidhya Bhushan and D. R. Sachdeva
5. Indian Society and Culture – Continuity and change by Nadeem Husain
6. House, Form and Culture – Amos Rappoport
7. History of Architecture, Banister Fletcher
8. Civilizations by Sir Kenneth Clark, Publisher: Hodder And Stoughton (15 August 2005)

SWARRNIM STARTUP AND INNOVATION UNIVERSITY

BACHELOR OF ARCHITECTURE – COURSE DETAILS

SEMESTER III

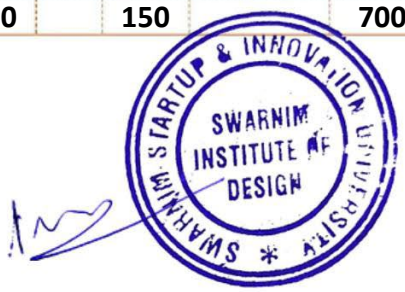
Year 2019-20

Semester 3

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33010301	Architecture Design-II	12	0	6	6	12
2	33010302	Building Material & Construction-III	6	2	2	2	6
3	33010303	Structure - II	2	2	0	0	2
4	33010304	Environment Science & Services - I	2	2	0	0	2
5	33010305	History of Architecture - II	2	2	0	0	2
6	33010306	Computer Application - I	4	0	2	2	4
7	23000014	Enterpreneurial Motivation	2.5	2	1	0	3
Total			**30.5**	**10**	**11**	**10**	**31**

Subject Name	Credit	Internal				External				Total
		TH	P	PR	P	TH	P	PR	P	
Architecture Design-II	12	0	0	50	25	0	0	50	25	100
Building Material & Construction-III	6	25	12.5	25	12.5	50	25	0	0	100
Structure - II	2	50	25	0	0	50	25	0	0	100
Environment Science & Services - I	2	50	25	0	0	50	25	0	0	100
History of Architecture - II	2	50	25	0	0	50	25	0	0	100
Computer Application - I	4	0	0	50	25	0	0	50	25	100
Enterpreneurial Motivation	2.5	0	0	50	25	0	0	50	25	100
Total	**30.5**	**175**		**175**		**200**		**150**		**700**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |



Semester: III

Subject: Architectural Design – II

Course Code: 33010301
Credits: 12

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	6	6	12

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

Material Studio: Material and Structure as determinants of Architectural Form.

Content:

1. Study of materials, properties and its characteristics through various case studies.
2. Understanding of materials and its properties to determine the form considering the given climatic conditions and functional requirements.
3. Understanding of basic structural systems in various materials (Timber, Bamboo, Mud, Brick, R.C.C, Fabric)
4. Applications of basic services considering the materials properties and limitations along with functional requirements.
5. Understanding the applications of different building materials as a genesis of form given (Building Language) for the architectural design.

Methodology:

The studio will be conducted based on selection of site, site visits, site analysis, preparation of presentation and 2D & 3D drawings, sketches and models. Primary and secondary case studies with respect to the project will be selected by the students and analysed.

Learning Outcome:

To generate the understanding of developing specific building language through applications of different building materials along with resolution of structural and service requirements of a building.

Books Recommended:

E-Sources key words:

Semester: III

Subject: Building Material and Construction – III

Course Code: 33010302
Credits: 6

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	2	6

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
25	12.5	25	12.5	50	25	--	--

Objective:

Understanding of basic structural systems, structural materials, construction & erection processes.

Content:

1. Traditional building materials and their uses in building construction.
2. Introduction to new technologies for use of traditional building materials and their uses in building construction.
3. Study of new materials and their use in building construction.
4. Study of different building materials made out of wood, steel, PVC, aluminium etc.
5. Various types of Doors and windows including various types of treatment of sill, lintels etc/ M. S. Grill.
6. Various types of fittings and hardware and its applications in building design.

Methodology:

The lectures will be based on theory, presentations and class assignments, making drawings, sketches and models. The students will be encouraged to do case studies and industrial site visits for the same.

LearningOutcome:

Understanding of traditional constructional techniques (Vernacular Architecture) through basic construction materials along with introduction of new building materials and its applications in terms of joinery details, form explorations, structural innovations and hardware fittings for resolving services in the building.

Book Recommended:

1. Construction of Building - Volume I by W. B. Mckay
2. Construction of Building – Volume II by R. Barry
3. Building Materials by Rangwala

E-Sources key words:

Semester: III

Subject: Structure-II

Course Code: 33010303
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

To understand deflection of structure.
To understand types of support condition.

Content:

1. Types of Supporting Condition – Cantilevered, Hinged, Continuous, Fixed
2. Concept of portal frame
3. Concept of deflection of structures and importance of deflection in design of structures
4. Roof Spanning Systems – Trusses, Domes, Vaults, Arches
5. Foundation – Types & Behavior

Methodology:

Understanding structural system at different construction stages & different structural loads & its impact on building.

Learning Outcome:

1.Explanation on different types of beams and loads applied on structures, types of supports and support conditions during the analysis, the use of truss, arches, domes and vaults in architecture through lecture and presentation.

2. Explanation of different types of roofing systems and concept of portal frame with the help of classroom presentation and certain video documentary.
3. Explanation on different types of foundation and load applied on them, the use of foundation in architecture through sketches and presentation.

Book Recommended:

1. Why Buildings stand up, Mario Salvadori, W. W. Norton & Company; Reissue edition (16 January 1991)
2. Why Buildings Fall Down – How Structures Fail, Matthys Levy (Author), Mario Salvadori, W. W. Norton & Company; Reprint edition (1 September 1994).
3. Strength of Material: R.S. Khurmi
4. Building Construction Illustrated; Francis D.K. Ching

E-Sources key words:

Semester: III

Subject: Environment Science & Services - I

Course Code: 33030305
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

To understand the correlation between built environment and climate

Content:

1. Climate – Constituent elements, classification of tropical climatic zones
2. Effect of climate on man, shelter and environment
3. Human comfort conditions – comfort chart, comfort zone, effective temperature
4. Macro Climate & Micro Climate

Methodology:

Lecture based on theory and class assignments, making presentations, sketches and models. The students will be encouraged to do case studies and industrial site visits for the same.

Learning Outcome:

The students shall be able to understand the importance of different climatic conditions on different geographical situation along with the importance of human comfort level in a particular built environment. The students shall also be able to understand the macro climate and micro climate.

Book Recommended:

E-Sources key words:

Semester: III

Subject: History of Architecture - II

Course Code: 33010305
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

1. Study of Temple architecture and its development.
2. Study of what defines the vernacular built forms and its aspects.
3. To Study Development of Western Art and Architecture

Content:

1. Development of various architectural styles with reference to the influencing factors such as
1. Geographical, climatic, religious social and political conditions.
2. Regional monuments of Gujarat and Rajasthan: Step-wells (Vav) and Reservoirs (Kund).
3. Architecture in Maratha Period: Pols - Khadkis, Terraced Temples.
4. Study of Sassanian architecture and its adaptation in Early Islamic Architecture (Spain, Turkey
5. and North-Africa).
4. Development of Western Art and Architecture: Early Christian, Byzantine.

Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Group presentations, discussions, debates and critiques.

Book Recommended:

1. Glimpse of world history
2. Ascent of man- J.Bronoski
3. Humanities through eras- Philip Soergel
4. An introduction to sociology- Vidhya Bhushan and D. R. Sachdeva
5. Indian Society and Culture – Continuity and change by Nadeem Husain
6. House, Form and Culture – Amos Rappoport
7. History of Architecture, Banister Fletcher
8. Civilizations by Sir Kenneth Clark, Publisher: Hodder And Stoughton (15 August 2005)

Semester: III

Subject: Computer Application - I

Course Code: 33010306
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	2	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

To develop skills for computer applications for preparing digital drawings.

Content:

1. Basics of Photoshop – Image editing, composition
2. Basics of Photoshop – Image rendering, lighting effects, drawing rendering
3. Basics of Corel Draw – Image editing, composition
4. Basics of Corel Draw – Image rendering, lighting effects, drawing rendering
5. Basics of Sketch up – 3D Drawings

Methodology:

Lecture based on theory and class assignments, learn presentation techniques & composition of sheets & prepare 2D & 3D drawings using different software.

Learning Outcome:

To develop architectural drawings in digital media

Book Recommended:

E-Sources key words:

SWARRNIM STARTUP AND INNOVATION UNIVERSITY

BACHELOR OF ARCHITECTURE – COURSE DETAILS

SEMESTER IV

Year 2019-20

Semester 4

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33010401	Architecture Design - III	12	0	6	6	12
2	33010402	Building Material & Construction - IV	6	2	2	2	6
3	33010403	Structure - III	2	2	0	0	2
4	33010404	Environment Science & Services - II	2	2	0	0	2
5	33010405	History of Architecture - III	2	2	0	0	2
6	33010406	Computer Applications - II	4	0	2	2	4
7	23000017	Project feasibility and marketing skills	2.5	2	1	0	3
Total			**30.5**	**10**	**11**	**10**	**31**

Subject Name	Credit	Examination Pattern								Total
		Internal				External				
		TH	P	PR	P	TH	P	PR	P	
Architecture Design - III	12	0	0	50	25	0	0	50	25	100
Building Material & Construction - IV	6	25	12.5	25	12.5	50	25	0	0	100
Structure - III	2	50	25	0	0	50	25	0	0	100
Environment Science & Services - II	2	50	25	0	0	50	25	0	20	100
History of Architecture - III	2	50	25	0	0	50	25	0	25	100
Computer Applications - II	4	0	0	50	25	0	0	50	25	100
Project feasibility and marketing skills	2.5	0	0	50	25	0	0	50	25	100
Total	**31**	**175**		**175**		**200**		**150**		**700**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

Semester: IV

Subject: Architecture Design - III

Course Code: 33010401
Credits: 12

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	6	6	12

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

Analysis of context and community housing as a determinant of Architectural character. Study of built form with special reference to climate, material, social & cultural context, physical environment.

Content:

1. Housing studies of existing settlements.
2. Complete architectural design of project/s of different nature at level of residence & small institution/ work place in the context of a traditional settlement.
3. Dwelling cluster design project (15-20 units to form a small community – Work done in Related Study Program or the measured drawing of traditional settlement may be used as the context)
4. Understanding of spatial configuration and building languages along with the issues of material, structure and services to generate an Architectural building language.

Methodology:

The studio will be conducted based on selection of site, site visits, site analysis, preparation of presentation and 2D & 3D drawings, sketches and models. Primary and secondary case studies with respect to the project will be selected by the students and analysed.

Learning Outcome:

Enhancing the knowledge of built form with special reference to climate, material, social & cultural context, physical environment.

Books Recommended:

1. Design strategies in Architecture, Edited by Geoffery Baker
2. Responsive Environment by Cutler & Cutler
3. A pattern Language by Christopher Alexander
4. Scale in Architecture by Frank Orr

E-Sources key words:

Semester: IV

Subject: Building Material and Construction IV

Course Code: 3301402
Credits: 6

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	2	6

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
25	12.5	50	12.5	50	25	--	--

Objective:

Understanding of various building components, their place and composition within the systems, possibilities of different material use.

Content:

1. Building Components: - Floor and Floorings
2. Building Components: - Staircase, Stairs, Steps, Ramps
3. Building Components: - Steel windows
4. Building Components: - Wooden roof construction details
5. Building Components: - Retaining walls, basement Compound wall/Gates

Methodology:

Lecture based on theory and class assignments, making drawings, sketches and working models. The students will be encouraged to do case studies and industrial site visits for the same.

Learning Outcome:

Understanding of principles and possibilities of various erection Technology and their applications.

Book Recommended:

1. Construction of Buildings – Volume – I by W. B. Mckay
2. Construction of Buildings – Volume – II by R. Barry
3. Construction Technology by Chaudhary

E-Sources key words:

Semester: IV

Subject: Structure III

Course Code: 33010403
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

Analysis of Structures.

Content:

1. Definition of determinate and indeterminate structures.
2. Fixed beam and Continuous Beams.
3. Basic methods of Analysis (Moment Distribution Method).
4. Introduction to advanced methods of analysis. Analysis of continuous beams of two to four spans. Truss, types of trusses, analysis of two-dimensional trusses using joint & graphical method.
5. Arch, types of arches, analysis of three hinges arches.
6. Concept and analysis of portal frame. Concept of deflection of structures and importance of deflection in design of structures.

Methodology:

Understanding structural system at different construction stages & different structural loads & its impact on building.

Learning Outcome:

Study of deflection of beams, trusses and frames through models.

Book Recommended:

1. Mechanics of Structures – I & II by S. B. Jurnakar and H. J. Shah
2. Strength of Materials by B. C. Punamia
3. Strength of Materials by R. S. Khumi
4. Elementary Structural Analysis by Norris & Wilbur
5. Fundamentals of Structural Analysis & Design by J. P. Parikh

E-Sources key words:

Semester: IV

Subject: Environment Science & Services II

Course Code: 33010404
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

Built Environment & Climate.

Content:

1. Ventilation – Air movement & fenestration, solar orientation, Sun path pattern & shading devices.
2. Traditional House Form & Settlement pattern in various tropical climates.
3. Design Tools – Mahoney Tables, Sun Path diagrams, etc
4. Day lighting – components, architectural methods of borrowing day light; control of glare.

Methodology:

Lecture based on theory and class assignments, making presentations, sketches and models. The students will be encouraged to do case studies and industrial site visits for the same.

Learning Outcome:

Understanding of climatic conditions and its resultant effects in the built environment of architectural design.

Book Recommended:

1. Manual of Tropical Housing by Otto. Koenigsberger
2. Design primer for hot climate by Allan Konya
3. Design with climate by Victor Olgyay
4. Man, Climate and Architecture by B. Givoni
5. Climatic Building Design by Donald Watson

E-Sources key words:

Semester: IV

Subject: History of Architecture III

Course Code: 33010405
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

1. Study of development of Sacred Architecture in India
2. Study of the development of early Islamic cultures and their impact on early Islamic Architecture.
3. Study of the Dark Ages in Europe and how it defined the Medieval Architecture.

Content:

1. Study of architectural vocabulary of the Dravidian Style in India, along with the temples of
4. Southern India.
2. Sacred Architecture of Indian Subcontinent (Hindu, Buddhist and Jain), together with Nagara
5. Style of Temple Architecture.
3. Beginnings of Islamic Architecture in India: Mosque (Masjid), Mausoleum (Maqbarah), Mortuary
6. Complex (Rauza).
4. Study Development of Western Art and Architecture : Medieval (Romanesque) and Gothic.

Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Group presentations, discussions, debates and critiques.

Book Recommended:

1. Global History of Architecture by Francis Ching
2. A history of Architecture by Sir Bannister Fletcher
3. Encyclopaedia of Architecture by Joseph Gwilt
4. Introduction to Indian Archtecture by Brinda Thapar

Semester: IV

Subject: Computer Application II

Course Code: 33010406
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	2	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

To develop skills for computer application for making drawing.

Content:

1. Autodesk 2D – Basic drawing techniques.
2. Autodesk 2D – Basic 2D drawings with hatch and other basic rendering techniques
3. Autodesk 3D – Basic 3D drawings
4. Google Sketch up 3D – Basic 3D modelling

Methodology:

Lecture based on theory and class assignments, learn presentation techniques & composition of sheets & prepare 2D & 3D drawings using different software.

Learning Outcome:

To prepare digital presentation drawings through Architectural Software.

BookRecommended:

E-Sources key words:

SWARRNIM STARTUP AND INNOVATION UNIVERSITY

BACHELOR OF ARCHITECTURE – COURSE DETAILS

SEMESTER V

Year 2019-20

Semester 5

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33010501	Architecture Design - IV	12	0	6	6	12
2	33010502	Building Material & Construction - V	6	2	2	2	6
3	33010503	Structure - IV	2	2	0	0	2
4	33010504	Environment Science & Services - III	2	2	0	0	2
5	33010505	History of Architecture - IV	2	2	0	0	2
6	33010506	Computer Applications - III	4	0	2	2	4
7	23000020	Scaling up the Venture	2.5	2	1	0	3
Total			**30.5**	**10**	**11**	**10**	**31**

Subject Name	Credit	Examination Pattern								Total
		Internal				External				
		TH	P	PR	P	TH	P	PR	P	
Architecture Design - IV	12	0	0	50	25	0	0	50	25	100
Building Material & Construction - V	6	25	12.5	25	12.5	50	25	0	0	100
Structure - IV	2	50	25	0	0	50	25	0	0	100
Environment Science & Services - III	2	50	25	0	0	50	25	0	20	100
History of Architecture - IV	2	50	25	0	0	50	25	0	25	100
Computer Applications - III	4	0	0	50	25	0	0	50	25	100
Scaling up the Venture	2.5	0	0	50	25	0	0	50	25	100
Total	**30.5**	**175**		**175**		**200**		**150**		**700**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

Semester: V

Subject: Architecture Design – IV

Course Code: 33010501
Credits: 12

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	6	6	12

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

To understand the approach to the institutional design process in terms of:

1. Integration of space, structure, materials, construction and services.
2. Client contact, active and passive user group.
3. Environmental concerns, energy efficient building criteria.
4. Part to whole and whole to part relationship character.

Content:

1. Introduction to Institution Design Philosophy and Ideology.
2. Framework of case studies on relevant Institutions.
3. Design Development and Schematic Design Process
4. Relationship of different functional, service and movement areas.

Methodology:

The studio will be conducted based on selection of site, site visits, site analysis, preparation of presentation and technical drawings, sketches and models. Primary and secondary case studies with respect to the project will be selected by the students and analysed.

Learning Outcome:

The student will have learnt to understand the philosophical and design aspects of making an institution and the complexity of design process obligatory for its identity.

Book Recommended:

1. Design strategies in Architecture, edited by Geoffrey Baker
2. Responsive Environment by Cutler & Cutler
3. A pattern Language by Christopher Alexander
4. Scale in Architecture by Frank Orr

E-Sources key words:

Semester: V

Subject: Building Material & Construction – V

Course Code: 33010502
Credits: 6

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	2	6

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
25	12.5	25	12.5	50	0	--	--

Objective:

To understand the basic fundamentals of all types of supporting services required in a building.

Content:

1. Glass as a building material, its types, behavior, failure and its use in constructing floors, roofs, openings, walls, stairs.
2. Hybrid systems, basement, retaining walls, diaphragm wall
3. Under ground, overhead and internal storage tanks and swimming pool, water proofing treatments.
4. Earthquake resistant structures.
5. Site development- compound wall and gates
6. Lifts, ramps, escalators, conveyer belts and elevators

Methodology:

The lectures will be based on theory, presentations and class assignments, making drawings, sketches and models. The students will be encouraged to do case studies and industrial site visits for the same.

Learning Outcome:

Understanding the supporting services and their management in a building.

Book Recommended:

1. Bhavikatti, S.S. Building Construction. Vikas Publishing House Pvt. Ltd, 2012.
2. McKay, J.K. Building Construction Volume IV. 4th ed., Longman Group Pvt. Ltd, 1970.
3. Gambhir, M.L. Building Construction. 4th ed., McGraw Hill Education Pvt. Ltd., 2013.

E-Sources key words:

Semester: V

Subject: Structure – IV

Course Code: 33010503
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	0	0	50	25	0	0

Objective:

1. To understand the basic theories and principles of steel structures.
2. To understand the properties of materials relevant to structural analysis.

Content:

1. Introduction to structural steel.
2. Introduction to footings for steel columns.
3. Types of connections – riveted, welded and bolted; methods of riveting, welding and bolting.
4. Concepts of tension members, compression member and flexural member.
5. Concept of built up beams and columns – recommended uses.
6. Concept of lacings, battening and importance of bracings.

Methodology:

1. Introduction of Indian Standard Codes (IS: 800-2007 & Steel Table).
2. Conceptual study and explanation with the help of presentation and models of rolled sections.
3. Conceptual study of general connections – beam to beam connections – beam to column connections – column to column connections – column to foundation connection.
4. Explanation with the help with sectional models on design of tension members, compression members and flexure members.
5. Explanation on foundation of steel columns in architecture through sketches and presentation of models.

Learning Outcome:

The students will gain knowledge of the structures designed in steel and how can it be incorporated in their design.

Book Recommended:

1. Design of Steel structures – Vol. I & II by S.K. Duggal
2. Design of Steel Structures – Vol. I & II by R.P. Rethaliya
3. Design of Steel Structures by Bresler, Lin & Scaly
4. Strength of Material by RK Bansal, Laxmi Publications, New Delhi
5. Seeking structure from nature by Jeffery Cook, BirkHauser

E-Sources key words:

Semester: V

Subject: Environment Science & Services - III

Course Code: 33010504
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

To learn the fundamentals and utility of solid waste and water management and a basic understanding of green architecture and conventional system of generation of electricity.

Content:

1. Solid and Hazardous Waste Management- types and sources, generation rates, solid waste components, Solid waste collection and transportation: container systems, layout of collection routes, transfer stations and transportation. Recycling and composting, disposal of solid waste – sanitary land filling, incineration of solid waste.
2. Water management- Sources of water, Water supply and distribution till the house and in a multi- storey building, sewage treatment and recycling/disposal, pipes, traps and solid waste, manhole, inspection chamber, septic tank, soak pit, Storm water drain, rain water harvesting
3. Electrical Services: Conduit, piping, Cases, Capping, Distribution/ Junction box; Wires/ Cables/ Cords; Lighting fixtures/ non-lighting fixtures; Switch boards.
4. Conventional system of electricity generation: Hydro, Solar, Wind.
5. Green Building System – I: Introduction to GRIHA, IGBC, and LEED.

Methodology:

1. Lectures will be based on theory, presentations
2. Presentations based on case studies and literature studies will be done to understand the concepts.
3. Site visits and industrial visits will be encouraged for better understanding and application of these concepts.

Learning Outcome:

To develop basic understanding of building services and conventional ways to manage it.

Book Recommended:

1. Bhavikatti, S.S. Building Construction. Vikas Publishing House Pvt.Ltd, 2012.
2. Mckay, W.B. Building Construction Volume-II. 4th ed., Logman Group Pvt.Ltd, 1970.
3. Mckay, J.K. Building Constuction Volume-IV. 4th ed., Longman Group Limited, 1993.

E-Sources key words:

Semester: V

Subject: History of Architecture – IV

Course Code: 33010505
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	2	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

1. Study of the genesis and development of Islamic Architecture under the Delhi Sultanate and Mughals, and how Islamic architecture of India corresponded with the architecture in Iran and Central Asia.
2. Study of the development of the Renaissance era, its achievements and the impacts on architecture across Italy.

Content:

1. Study of the genesis and development of Islamic Architecture in India (Sultanate and Mughal).
2. Provincial Islamic Architecture in India, with a focus on the Islamic Architecture of Gujarat.
3. Study of Late Islamic Architecture in Central Asia and Iran.
4. Renaissance architecture in Italy and rest of Europe (Early and High Renaissance).
5. Developments in Europe after the medieval period: The Renaissance (Early and High), Baroque and Rococo.

Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Group presentations, discussions, debates and critiques.

Book Recommended:

1. Global History of Architecture by Francis Ching
2. A history of Architecture by Sir Bannister Fletcher
3. Encyclopedia of Architecture by Joseph Gwilt
4. Introduction to Indian Architecture by Brinda Thapar

E-Sources key words:

Semester: V

Subject: Computer Application – III

Course Code: 33010506
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	2	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

To learn to create 3D renderings and walk through for an interior space.

Content:

1. Advance Autodesk AutoCAD – Technical drawings, layout, rendering
2. Advance Google SketchUp – 3D modelling and rendering
3. Introduction to ArchiCAD

Methodology:

1. Theoretical understanding of the software and its application through presentations.
2. Practical understanding of tools by its application on design or any given space.

Learning Outcome:

To understand the concept of BIM through architectural software and prepare digital presentation drawings.

Books Recommended:

AutoCAD 2000 by George Omura

E-Sources key words:

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BACHELOR OF ARCHITECTURE – COURSE DETAILS

SEMESTER VI

Year 2019-20

Semester 6

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33010601	Architecture Design - V	12	0	6	6	12
2	33010602	Building Material & Construction – VI	6	2	2	2	6
3	33010603	Structure - V	2	2	0	0	2
4	33010604	Environment Science & Services - IV	2	2	0	0	2
5	33010605	History of Architecture - V	2	2	0	0	2
6	33010606	Computer Applications - IV	4	0	2	2	4
7	23000021	Idea to Minimum Viable Product	2.5	2	1	0	3
	Total		**30.5**	**10**	**11**	**10**	**31**

Subject Name	Credit	Examination Pattern								Total
		Internal				External				
		TH	P	PR	P	TH	P	PR	P	
Architecture Design - V	12	0	0	50	25	0	0	50	25	100
Building Material & Construction - VI	6	25	12.5	25	12.5	50	25	0	0	100
Structure - V	2	50	25	0	0	50	25	0	0	100
Environment Science & Services - IV	2	50	25	0	0	50	25	0	20	100
History of Architecture - V	2	50	25	0	0	50	25	0	25	100
Computer Applications - III	4	0	0	50	25	0	0	50	25	100
Idea to Minimum Viable Product	2.5	0	0	50	25	0	0	50	25	100
Total	**30.5**	**175**		**175**		**200**		**150**		**700**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

Semester: VI

Subject: Architecture Design – V

Course Code: 33040601
Credits: 12

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	6	6	12

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

To prepare working drawings and details of a residence/ commercial place/ public place.

1. Building drawings (of previously prepared design studio project) to be prepared as part of the contract documents with proper labelling and dimensioning techniques.
2. Drawings shall include: plans, foundation plans, lay out plan showing different buildings, internal roads, water supply, sewerage including area drainage plan.
3. Elevations of all sides and sections: transverse and longitudinal sections, sections through staircase lift and sanitary units.
4. Architectural details: scheduling of different finishes, doors, windows including hardware fixtures.
5. Preparation of roof drainage systems layout, layout of sanitary and plumbing lines and scheduling the fixtures in toilets and kitchen etc. layout of electrical lines and fixtures.

Content:

1. Execution drawing systems and methods. (Previous semester design project – partial/full)
2. Trade literature, detailing methods, architectural working drawing.
3. Choice of materials, fixtures, fittings, availability and constructional feasibility.
4. Integration of building systems and services.
5. Detailed drawings to include all components of building like doors, windows, lifts, staircases elevators etc.

Methodology:

The studio will be conducted based on making technical drawings for foundation plans, layout plan building plans – their relevant elevations and sections, and utility plans.

Learning Outcome:

To familiarize the students with drawings which are prepared for the actual construction/ execution of the buildings.

Book Recommended:

E-Sources key words:

Semester: VI

Subject: Building Material and Construction – VI

Course Code: 33010602
Credits: 6

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	2	6

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
25	12.5	25	12.5	50	25	--	--

Objective:

To understand different types of walls and their treatment and supporting structures used for construction of a building, retrofitting and repair of built form.

Content:

1. Building finishes with different materials and techniques, wall cladding
2. Formwork, ceiling, Timbering, Shuttering, Shoring, Shuttering- their techniques and types and use in building
3. Partitions- their types, use and method/techniques of construction with different materials
4. Retrofitting and repair

Methodology:

The lectures will be based on theory, presentations and class assignments, making drawings, sketches and models. The students will be encouraged to do case studies and industrial site visits for the same.

Learning Outcome:

Understanding types of internal walls, their treatments, built form and their repair techniques.

Book Recommended:

1. Mackay, W.B. Building Construction Volume-III. 5th ed., Longman Group Ltd, 1974.
2. Bhavikatti, S.S. Building Construction. Vikas Publishing House Pvt.Ltd, 2012.

E-Sources key words:

Semester: VI

Subject: Structure – V

Course Code: 33010603
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

1. Understanding of basic theories and principles of advance structures.
2. Understanding of properties of materials relevant to structural analysis.

Content:

1. Introduction to advance structures.
2. Concepts and design of Retaining Wall.
3. Concepts of Long Span Structures.
4. Concepts on Structural system of Vertical City.
5. Concepts of Composite Structures.
6. Concepts of Structural system for Industry.

Methodology:

1. Introduction of advance structures.
2. Conceptual study and explanation with the help of presentation and models of retaining wall.
3. Conceptual study of long span structures.
4. Explanation with the help with sectional models on structural system of vertical city.
5. Explanation with the help with sectional models for joinery detail of composite structures. How addition and alteration of a building is related to structural system and how to deal them.
6. Explanation with the help with sectional models on machine foundation, gantry girder etc.

Learning Outcome:

The students will gain knowledge of advanced structural systems and their effective use in architecture and how can it be incorporated in their design. With this the student will have a broad knowledge of varied types of existing advanced structures.

Book Recommended:

1. Building Construction, Rangwala
2. Building Construction, S.P. Bindra
3. Design of Steel Structures, Ramchandra
4. Structure as Architecture, Andrew W. Charleson
5. Comparative Design of Structures, Shaopei Lin and Zhen Huang

E-Sources key words:

Semester: VI

Subject: Environment Science & Services - IV

Course Code: 33010604
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

Understanding green buildings, acoustics and different mechanical based services used in a building in detail.

Content:

1. Acoustics – sound and its behavior, auditorium/theater, sound insulation and materials used for it, different types of sound according to amplitude and human range, impact of acoustics on a building
2. HVAC- types, mechanized ventilation, air conditioning process, types of insulation.
3. Firefighting – different types of buildings, norms, precaution in different types of fire, mechanism for fire exhaustion.
4. Mechanical services: lifts, escalators, elevators.
5. Green Building Systems- II: practices- local/national and global, application of various materials in green buildings, planning aspects to achieve sustainable architecture.

Methodology:

Lectures based on theory and making presentations for different mechanical services. The students will be encouraged to do case studies and site visits for the same and application of concepts in their design project.

Learning Outcome:

To enrich students' understanding on green buildings along with acoustics and application of mechanical based services in a building.

Book Recommended:

1. Doelle, Leslie L. Acoustics in Architectural Design. U.S. Department Of Health Education & Welfare Of Education, 1965, Accessed 6 Aug 2019.
2. Kleiner, Mendel. Acoustics of Small Rooms. CRC Press Taylor & Francis Group, 2014, Accessed 6 Aug 2019.
3. Koeningsberger, O. H. Manual of Tropical Housing and Building. Longman, 1974.
4. GRIHA Manual. Ministry of New and Renewable Energy, Govt. Of India and the Energy and Resources Institute, 2011.

E-Sources key words

Semester: VI

Subject: History of Architecture - V

Course Code: 33010605
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

1. Study of colonial architecture in India, and the evolution of Indo-Saracenic architecture.
2. Study of how industrialization changed with global scenario of architecture, and how it paved way of modernist architecture.
3. Study of the contemporary and global trends in architecture in India and the world.

Content:

1. Study of the British Colonial Architecture and advent of new cities
2. How the other Colonies built in India (Dutch, French and Portuguese)
3. Impact of Industrialization in Europe and Rise of Modernism.
4. Advent of Modernism and Skyscrapers in US.
5. Architecture in India post-independence
6. Globalization and Contemporary Architecture across the globe

Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Group presentations, discussions, debates and critiques.

Book Recommended:

1. History of Modern Art: Painting, Sculpture, Architecture by H. H. Arnason
2. Global History of Architecture by Francis Ching
3. Encyclopaedia of Architecture by Joseph Gwilt
4. Introduction to Indian Architecture by Brinda Thapar

Semester: VI

Subject: Computer Applications – IV

Course Code: 33010606
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	2	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

To develop skills for computer application for making architectural, technical, presentation drawings and 3D modelling.

Content:

1. Introduction to Adobe InDesign – compiling and composition
2. Advance ArchiCAD
3. Introduction to Revit

Methodology:

1. Theoretical understanding of the software and its application through presentations.
2. Practical understanding of tools by its application on design or any given space.

Learning Outcome:

The students will learn how to use the mentioned software, like pencils/pens as tools and computers, like sketchbooks/cartridges as mediums. They'll also be made aware of the current technological advancements in the field.

Books Recommended

1. InDesign CS6 in Simple Steps. (2013). New Delhi: Dreamtech Press.
2. Duell, R., Hathorn, T. and Hathorn, T. (2013). AUTODESK® REVIT® ARCHITECTURE 2014. [eBook] Indianapolis, Indiana: John Wiley & Sons, Inc. Available at: https://civilenglineering.files.wordpress.com/2014/10/architect.pdf [Accessed 12 Aug. 2019].

E-Sources key words:

SWARRNIM STARTUP AND INNOVATION UNIVERSITY

BACHELOR OF ARCHITECTURE – COURSE DETAILS

SEMESTER VII

Year 2019-20

Semester 7

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33010701	Office Training	30	0	0	30	30
Total			**30**	**0**	**0**	**30**	**30**

Subject Name	Credit	Examination Pattern								Total
		Internal				External				
		TH	P	PR	P	TH	P	PR	P	
Office Training	30	0	0	50	25	0	0	50	25	100
Total	**30**			**50**				**50**		**100**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

Semester: VII

Subject: Office Training

Course Code: 33010701
Credits: 30

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	0	30	30

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

To train the students in varied aspects of design focused on interior spaces and provide adequate knowledge of the industry to improve them on a holistic level.

Content:

The Office Training of sixteen-week duration envisages varied experience in order to ensure exposure to the student to various tasks in an office. It is up to the student to choose the office and get consent letter by the employer and their details.

The student will be issued a set of log sheets, which has to be filled weekly and authenticate the information with the employer after every four weeks.

The student will submit the log sheet, copies of the drawings prepared, photographs of the work executed on site and the covering letter by the employer at the time of viva date declared by the university.

At the end of the training period, student will have to procure a certificate of training and satisfactory performance from the concerned office in the prescribed format. Certificate of satisfactory completion of training same shall be submitted to the institute.

Learning Outcome:

During the training, the students will gain an adequate knowledge of working in an office to gain experience in varied aspects of design, industry, site works and other miscellaneous work of an office. This will help the students prepare holistically for future design works.

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BACHELOR OF ARCHITECTURE – COURSE DETAILS

SEMESTER VIII

Year 2019-20

Semester 8

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33010801	Architectural Design-VI	14	0	7	7	14
2	33010802	Theory of Architecture	4	2	0	2	4
3	33010803	Site Planning	4	2	0	2	4
4	33010804	Design Seminar-I	4	2	0	2	4
5	33010805	Construction Management	2	1	1	0	2
6	23000024	Managing Innovation & IPR for Entrepreneurs	2.5	2	1	0	3
Total			**30.5**	**9**	**9**	**13**	**31**

Subject Name	Examination Pattern									
	Credit	Internal				External				Total
		TH	P	PR	P	TH	PPR		P	
Architectural Design- VI	14	0	0	50	25	0	050		25	100
Theory of Architecture	4	50	25	0	0	50	25	0	0	100
Site Planning	4	0	0	50	25	50	25	0	0	100
Design Seminar-I	4	0	0	50	25	0	0	50	25	100
Construction Management	2	0	0	50	25	0	0	50	25	100
Managing Innovation & IPR for Entrepreneurs	2.5	0	0	50	25	0	0	50	25	100
Total	**30.5**	50		250		100		200		600

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

Semester: VIII

Subject: Architectural Design- VI

Course Code: 33010801
Credits: 14

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	7	7	14

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

Determinants of space or space arrangement in Urban and Rural Housing and their relevance, developing an appreciation of Housing as a process evolving itself with changes in people-place-time. The studio will focus on developing an understanding of complex issues related to urban settings through projects varying from urban inserts, urban and rural housing.

Content:

1. Identification of the cultural factors of space making such as notion of privacy and territoriality, family structure and hierarchy, gender roles, occupational associations, traditional values and their continuity etc., interpretations of socio-cultural factors in the built form in terms of spatial organization, orientation, open, semi open and closed spaces correlation, scales and proportions etc.
2. Climate and topography, local construction system and use of materials, bye laws
3. Design of various typologies such as dwelling-cluster and neighborhood in a specific community and context, relevant case studies and their analysis, literature review, exercises related to relevant or appropriate construction systems and materials.
4. One major Studio Project aimed at developing an appropriate design of housing cluster suitable to the site [Rural and Urban Sector] set of Presentation Drawings that clearly communicates the idea.

Methodology:

Students will be exposed to varied primary and secondary case studies and multiple design methods for urban and rural housing. They will be expected to propose innovative yet contextual response to the given conditions.

Learning Outcome:

The student will be able to propose an appropriate design of urban and rural housing cluster suitable to the given site. The students will also be able to identify the physical, cultural and socio- economic factors of space making in urban and rural housing.

Book Recommended:

1. House Form and Culture by Rapoport, Amos
2. Architecture without Architects by Rudofsky, Bernard
3. EVAW by Oliver, Paul
4. Contemporary Architecture in India by Joglekar, M. N.
5. Co-housing by Mc Camant & Durrett
6. Life, Works and Writings of Laurie Baker by Bhatia, Gautam
7. Housing and Urbanization by Correa, Charles

E-Sources key words:

Semester: VIII

Subject: Theory of Architecture

Course Code: 33010802
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

1. To introduce the various facts of architecture and it's influencing factors.
2. To introduce the formal vocabulary of architecture as one of the ways to experience the built environment.
3. To understand and appreciate the universals of architectural form and space in terms of elements and principles within particular historical, cultural and geographic contexts.

Content:

1. Definitions of Architecture – Origin of Architecture – architecture as a discipline – context for architecture as satisfying human needs: functional, aesthetic and psychological-outline of components and aspects of architectural form-site, structure, skin, materials, services, use, circulation, expression, character, experience – Introduction to the formal vocabulary of architecture and Gestalt ideas of visual perception.
2. Understanding perceptual effects of specific configuration of architectural spaces – Enclosure – Internal and External, Continuous spaces – Spatial relationship and its types, spatial organization: Centralized, Linear, Radial Clustered, Grid –built form and open space relationships.
3. Understanding fundamental principles such as proportion, scale, balance, symmetry/asymmetry, rhythm, axis, hierarchy, datum, unity, harmony, dominance, climax – Movement with reference to the architectural form and space –detailed study of relationship between architectural form and circulation – Types of circulation – Building approach and entrance, path configuration and form, path space relationship, orientation.
4. Classical, Neoclassical, Post Modernism
5. Modern Style in Architecture

Methodology:

The lectures will be based on theory, presentations and assignments, making drawings, sketches and models. The students will be also be encouraged to do case studies and its analysis.

Learning Outcome:

The students will be able to identify the several configuration of architectural spaces, various eras and movements in the history of architecture, their relevance in contemporary era and study of fundamental architectural principles.

Books Recommended:

1. Simon Unwin, “Analysing Architecture”, Rouledge, London, 2003.
2. Pramar V.S., “Design Fundamentals in Architecture”, Somaiya Publications Private Ltd., New Delhi, 1973.
3. Yatin Pandya, “Elements of Space making”, Mapin 2007.
4. Leland M.Roth, “Understanding Architecture: Its Experience History and Meaning”, Craftsman house, 1994.
5. Peter von Meiss, “Elements of architecture –from form to place”, Spon Press 1977.
6. Rudolf Arnheim, “The dynamics of architectural form”, University of California Press, 1977.
7. Neils Prak, “The language of Architecture”, Mounton & Co., 1968.
8. Paul Alan Johnson, “The Theory of Architecture –Concepts and themes”, Van Nostrand
9. Reinhold Co., New York, 1994.
10. Helen Marie Evans and Carla David Dunneshil, “An invitation to design”, Macmillan Publishing Co. Inc., New York, 1982.

E-Sources key words:

Semester: VIII

Subject: Site Planning

Course Code: 33010803
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	50	25	--	--

Objective:

1. To develop sensitivity to factors influencing site design/planning in Rural or Urban area,
2. To develop understanding of principles and techniques of site planning and apply them to actual situations/conditions.
3. To emphasize the role of site planner in site planning/ design.

Content:

1. Introduction to site planning, Importance of site planning, Various factor's affecting to Site planning process Site analysis - understanding various factors influencing site selection and resource analysis.
2. Importance of site planning for starting a new site and Site Set up in Site Planning
3. Basic requirements for starting a new sites
4. How to influence of site data like contouring, rain intensity, catchment area, geological conditions, local tradition, material, water resources, sanitation disposal facility etc.
5. Site planning in urban area and Rural Area [Particularly Mass Housing - Site planning in natural area]
6. Site planning standards, sources of information for site data and site information
7. Importance of contour survey map in site planning and interpretation
8. Importance of water supply and sanitation/ drainage system in site planning
9. Land use and circulation, zoning, service systems in site planning
10. Various Factors affecting for Site Planning for different project like Mass Housing Project, Residential projects, Industrial Project, Institutional project, Public Project, Resort / Tourist Project
11. Site Planning: Selection of site for various projects, consideration of physical characteristics of site, locational factors, orientation, climate, topography – Landscaping – Mass Housing design – Traditional housing, cluster housing – apartments and high-rise housing [vertical development of housing] – integration all types of services, parking, incorporation of green sustainable practices –prefabrication in housing.

Methodology:

The lectures will be based on theory, presentations and assignments, making drawings, sketches and models. The students will be also be encouraged to do case studies and analysis based on the criterions of site planning.

Learning Outcome:

At the end of the semester, the student will be able to identify physical, cultural and socio- economic factors which can later be implied to the students' respective designs.

Book Recommended:

1. Site planning, Lynch, Kevin
2. A Guide to Site and Environmental Planning, Rubinstein, Harvey M
3. Grade Easy, Untermann, Richard K.
4. Site Planning for Cluster Housing, Untermann, Richard K.
5. Design with Nature, Mc Harg, Ian
6. Urbanization Primer, Caminos, Horatio, and Reinhard Goethert
7. Designed for Recreation, Beazley Elizabeth
8. Campus Planning, Dober, Richard P.
9. The Granite Garden, Spirn, Anne Whiston

E-Sources key words:

Semester: VIII

Subject: Design Seminar – I

Course Code: 33010804
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

The Design Seminar focuses on various Architectural / Social / Cultural issues pertaining to the Community Planning, Urban Planning or Urban Design OR Rural Planning/design. The focus will be to debate / discuss these issues in the classroom as well as general participatory discussions.

Content:

1. Nature and function of research, scientific research, meaning of research in the field of design.
2. Applied research: stages of research and design, design and research methodology.
3. Techniques of data collection
4. Forms of research reporting, structure of a report
5. Writing skills, presentation aids
6. Use of primary and secondary references, bibliography, cross references etc.
7. Nature of an undergraduate thesis, its structure and other requirements.

Methodology:

The students will focus on the understanding and documenting essentials of architectural experiences and meanings, and issues in contemporary architecture through case studies. The students will also sensitise themselves towards critical writing which shall enable them to understand and interpret human activities and architectural qualities in changing contexts using relevant mediums.

Learning Outcome:

With this, the students will be able to get prepared for research and analysis in architecture.

Books Recommended

E-Sources key words:

Semester: VIII

Subject: Elective - Construction Management

Course Code: 33010805
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
1	1	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

To understand different management techniques suitable for planning and constructional Projects and to understand the management system for accomplishing the task efficiently in terms of both time and cost.

Content:

1. Project management concepts -objectives, planning, scheduling Controlling and role of decision in Project management. Traditional management system, Gantt's approach, Load chart, Progress Chart, Development of bar chart, Merits and Demerits
2. Project Network -Events Activity, Network Rules, Graphical Guidelines for Network, Umpiring the events, Cycles, Development of Network -planning for Network Construction, Models of Network construction, steps in development of Network. Work Break down Structure, hierarchies. Concepts: critical path method -process, activity time estimate, Earliest Event time, latest allowable Occurrence time, starts / finishes time of activity, float, and critical activity and path problems.
3. Cost model - Project cost, direct cost, indirect cost, slope curve, Total project cost, optimum duration contracting the network for cost optimization. Steps in cost optimization, updating, resource allocation-resource smoothing, and resource levelling.
4. PERT network, introduction to the theory of probability and statistics. Probabilistic time estimation for the activities for the activities of PERT Network.
5. Introduction: Creating a New project, building task. Creating resources and assessing costs, refining your project. Project Tracking-Understanding tracking, recording actual. Reporting on progress. Analyzing financial progress.

Methodology:

The lectures will be based on theory, presentations and class assignments, and sketches. The students will be encouraged to do case studies and construction site visits for the same.

Learning Outcome:

The students will by the end of the semester will have known phases of construction project, Indian construction industry need of construction management, stakeholders and organization for construction project management. They will also know about construction equipment management, construction material management: material management functions, construction project cost and cost and value managements and construction quality and safety management.

Book Recommended:

1. Dr. B.C. Punmia and K.K. Khandelwal -Project planning and control woth PERT/CPM, Laxmi publications, New Delhi, 1987.
2. Elaine Marmel, Microsoft office Project 2003 Bible, Wiley Dreamtect (P) Ltd., New Delhi,2004.
3. Sam Kubba, “Green Construction Project Management and Cost Oversight”, Elsevier, 2010.
4. S.P. Mukhopadyay, “Project Management for architects and Civil Engineers”, IIT, Kharagpur 1974.
5. Jerome D. Wiest and Ferdinand K. Levy, “A Management guide to PERT/CPM”, prentice hall of Indian pub. Ltd. New Delhi 1982.
6. SR.A. Burgess and G. White, “Building production and project management”, the Construction press, London 1979

E-Sources key words:

SWARRNIM STARTUP AND INNOVATION UNIVERSITY

BACHELOR OF ARCHITECTURE – COURSE DETAILS

SEMESTER IX

Year 2019-20

Semester 9

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33010901	Architecture Design - VII	16	0	8	8	16
2	33010902	Urban Planning	2	2	0	0	2
3	33010903	Architectural Research and Programming	4	2	2	0	4
4	33010904	Design Seminar - II	4	2	2	0	4
5	33010905	Elective-Advance Technology in Architecture	4	2	1	1	4
Total			**30**	**8**	**13**	**9**	**30**

Subject Name	Examination Pattern									
	Credit	Internal				External				Total
		TH	P	PR	P	TH	P	PR	P	
Architecture Design - VII	16	0	0	50	25	0	0	50	25	100
Urban Planning	2	50	25	0	0	50	25	0	0	100
Architectural Research and Programming	4	50	25	0	0	50	25	0	0	100
Design Seminar - II	4	0	0	50	25	0	0	50	25	100
Elective-Advance Technology in Architecture	4	0	0	50	25	0	0	50	25	100
Total	**30**	**100**		**150**		**100**		**150**		**500**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

Semester: IX

Subject: Architecture Design – VII

Course Code: 33010901
Credits: 16

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	8	8	16

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

Learn about reading and documenting urban fabric and to understand the idea of urban space. To understand the difference between urban designs as opposed to urban development. To understand the role of architecture in shaping urban fabric and create design which fits into urban contact. To understand the needs of privacy, community spaces, efficiency of open spaces and idea of extended living areas.

Content:

1. Studio projects shall be based on considering the principals involved in community architecture.
2. Concepts of sustainable architecture and energy efficient buildings reuse recycled and recharging resources such as water, solar bio-resources; can be introduced in the studio design. The design can also be sensitive to the needs of disabled, aged people and children.
    1. Multiple functions.
    2. Public access to majority of the space,
    3. Large-gathering areas, which are open and extendable to the immediate urban context
    4. Analyzing structural feasibility of the project to adopt various structural systems for spanning.
3. High-rise building Projects like transport interchanges, large retail areas with entertainment areas, transport terminals with commercial areas, performing art center with museums and such multiple functions shall be taken.

Methodology:

Students will be exposed to varied primary and secondary case studies and multiple design methods for urban fabric. They will be expected to propose innovative yet contextual response to the given conditions.

Learning Outcome:

The student will be able to propose an appropriate design of urban fabric suitable to the given site. The students will also be able to identify the physical, cultural and socio- economic factors of space making in urban and rural housing.

Books Recommended:

1. Garden Cities: Theory & Practice of Agrarian UrbanismBy Andrés Duany and Duany Plater-Zyberk
2. By the City, For the City: An Atlas of Possibility for the Future of New York by The Institute for Urban DesignMulti-Story Books
3. Pocket Neighborhoods: Creating Small-Scale Community in a Large-Scale World by Ross ChapinTaunton Press.

E-Sources key words:

Semester: IX

Subject: Urban Planning

Course Code: 33010902
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

Architecture, community/neighborhood design, urban design and urban planning are connected hence architecture, is not an isolated private statement. Rather, it is at once a public (urban) act and a reflection of our understanding of the world at any given moment: i.e., what it might be. It will operate on the premise that public spaces are important to the livability of a city. The public realm quite literally provides the platform for its arts and culture to exist and adds to the desirability of its inhabitants. Developing an understanding of urban context with its schematic abstraction and contemporary manifestations

Content:

1. Evolution of human settlements & Interpretation of urban forms – historic determinants and settlement types; an overview of landmark developments in conceptual theories related to settlement patterns and the resulting dynamics of changing urban forms and interpretation of urban form as manifested in literature, arts, technology and politics during different stages of time.
2. Understanding the term Urban: Definitions and Approaches, looking at how various theorists have defined / understood the “urban” or the “city” as an object of investigation.
3. Urbanism & New Urbanism
4. Understanding the term Urban Design and inter-relation of Architecture and Urban Design
5. 'Urban Design' as a focus on physical improvement of the public environment.
6. Public Realm, definition and understanding the design of Public realm
7. City Scape / Town Scape, understanding and analysis
8. Understanding of Terminologies such as Tissue, Block, Grains, Porosity, Typology, District, Landmarks.
9. Contemporary Planning Process & Mechanisms –significance of land use planning, Development Plan & various methods of managing land as TP Schemes etc.

Methodology:

The lectures will be based on theory, presentations and class assignments, and sketches. The students will be encouraged to do case studies and construction site visits for the same.

Learning Outcome:

The student will be able to propose an appropriate design of urban fabric refer different theories & approaches. The students will also be able to analyst the physical, cultural and socio- economic factors also familiar with different terminologies related to Urban planning.

Books Recommended:

4. Garden Cities: Theory & Practice of Agrarian UrbanismBy Andrés Duany and Duany Plater-Zyberk
5. By the City, For the City: An Atlas of Possibility for the Future of New York by The Institute for Urban DesignMulti-Story Books
6. Pocket Neighborhoods: Creating Small-Scale Community in a Large-Scale World by Ross ChapinTaunton Press.

E-Sources key words:

Semester: IX

Subject: Architectural Research & Programming

Course Code: 33010903
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	0	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

To understand concept, need and scope of architectural programming. To develop research skills necessary for programming. To develop the ability to synthesize data/information in order to evolve the pre-design concept. The process must investigate the organizational, social and individual aspects of overt behavior in any social organization. Programming is the analytical aspect of design. The course focuses on collecting data, procedure, and techniques which can help improve design and practice. Programming is information processing process involving a disciplined methodology of data collection, analysis, organization, communication and evaluation. Programming is basically pre-design service leading in major decision making aiming at improving our built environment in areas of interior architecture, architecture and urban planning and design.

Content:

1. Introduction to programming, Identification of objectives for programming.
2. Gathering information/ educating client, Process of programming.
3. The methodology for information gathering, Analysis, organization and interpretation of data/information.
4. Documentation and presentation of material.
5. Computer aid in programming.
6. Projection and forecasting in programming, Case studies of architectural programming.
7. Post occupancy evaluation.
8. The students will be required to gather information, data for the particular project. The final submission of the report will incorporate analysis, interpretation and presentation of the collected material along with conceptual pre-design strategy.

Methodology:

The lectures will be based on theory, presentations and class assignments, and sketches. The students will be encouraged to do case studies and construction site visits for the same.

Learning Outcome:

The final submission of the report will incorporate analysis, interpretation and presentation of the collected material along with conceptual pre-design strategy via programming.

Books Recommended:

1. Architectural programming, Kumlin, Robert R.
2. The architect's guide to programming, Palmer Mickey A.
3. The impact of the client organizationon the programming process, Faberstein,Jay(Edited by Wolfgang Preiser, Van Nostrand Reinhold)
4. Architectural programming: Information Management for Design Duerk, Donna P.(Van Nostrand Reinhold)
5. Behavioral Research Methods in Environmental Design Michaelsin, William Hutchinson Ross)
6. Problem seeking: An Architectural Programming primer Pena, William M. (AIA Press)

E-Sources key words:

Semester: IX

Subject: Design Seminar - II

Course Code: 33010904
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	0	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

The Design Seminar focuses on various Architectural / Social / Cultural issues pertaining to the Community Planning, Urban Planning or Urban Design. The Focus will be to debate / discuss these issues in the classroom as well as general participatory discussions. The students will be doing research on the themes chosen for the seminar.

Content:

1. Nature and function of research, scientific research, meaning of research in the field of design.
2. Applied research: stages of research and design, design and research methodology.
3. Techniques of data collection
4. Forms of research reporting, structure of a report
5. Writing skills, presentation aids
6. Use of primary and secondary references, bibliography, cross references etc.
7. Nature of an undergraduate thesis, its structure and other requirements.

Methodology:

The students will focus on the understanding and documenting essentials of architectural experiences and meanings, and issues in contemporary architecture through case studies. The students will also sensitise themselves towards critical writing which shall enable them to understand and interpret human activities and architectural qualities in changing contexts using relevant mediums.

Learning Outcome:

With this, the students will be able to get prepared for research and analysis in architecture.

Books Recommended

E-Sources key words:

Semester: IX

Subject: Elective – Advance Technology in Architecture

Course Code: 33010904
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	1	1	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

The subject focuses upon the advanced technology which is gaining popularity for its application in Architecture.

Content:

1. Nano Technology
2. Virtual Reality Techniques in designing and presentation.
3. Advancements in Concreting
4. Geosynthatics
5. Smart Devices.

Methodology:

The lectures will be based on theory, presentations and class assignments, and sketches. The students will be encouraged to do case studies and construction site visits for the same.

Learning Outcome:

With this, the students will be able to gain knowledge in contemporary advance technology & their application /use in Project.

Books Recommended

E-Sources key words:

SWARRNIM STARTUP AND INNOVATION UNIVERSITY

BACHELOR OF ARCHITECTURE – COURSE DETAILS

SEMESTER X

Year 2019-20

Semester 10

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1		Thesis	26	6	8	12	26
2		Professional Practice & Valuation	4	2	2	0	4
Total			**30**	**8**	**6**	**14**	**30**

Subject Name	Credit	Examination Pattern								Total
		Internal				External				
		TH	P	PR	P	TH	P	PR	P	
Architecture Design - VII	26 4	0	0	50	25	0	0	50	25	100
Urban Planning		50	25	0	0	50	25	0	0	100
Total	**30**	**50**		**50**		**50**		**50**		**200**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

Semester: X
Subject: Thesis
Course Code:
Credits: 26

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
6	8	12	26

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
--	--	50	25	--	--	50	25

Objective:

Each student is expected to prepare a design thesis based on the understanding developed by student under a department approved guide/adviser. The thesis may be a design-oriented project or research topic approved by the department. The thesis should reflect the knowledge gained from the entire course under taken by the student in all the previous semesters. The particulars of schedule, content, presentation, formal, etc., as decided by the department time to time, shall be strictly followed. At the end of the semester, each student is expected to submit all original drawings or research report prepared as per the department's specifications, three copies of the report in the specified format and a modern should be submitted to the department after obtaining the approval of the respective guide/adviser. The department shall schedule the final viva-voce, at its convenience, only after the thesis submission by a student.

Thesis programme is in depth focused study of a particular building design project. A student is expected to study a case study before attempting design. Student is also expected to select planisible site before his/her design project. Student is expected to resolve design project in totality encompassing all the aspects of building design such as Structure, Climatic orientation, Behavioural aspects, services, building material and technology.

Methodology:

The students will undertake this design project with guidance from a mentor, who is a part of the selected industry. They shall meet their external mentor on a regular basis, who shall guide them and keep track of their progress. Apart from this, they are supposed to be in constant dialogue with their internal mentor from the university, throughout the duration of the semester. The thesis will be divided in the form of reviews at every stage as mentioned below:

1. Introduction to Thesis Review / Project Work - Explaining concept of approaching a topic of thesis and understanding the importance of subject and its importance.
2. Topic discussion - 1- online - Identifying Topics - minimum 3 topics for discussion. Conducting Individual Discussions with respective faculties.
Topic discussion - 2 - online - Identifying Topics - minimum 3 topics for discussion. Individual Discussions with respective faculties.
3. Introducing your topic - framing your questions, report writing, preparing mock A4 size portrait document, presenting online to your respective internal guides.
4. Topic discussion - 3 - online- Finalizing topic with valid base material as research.
5. Internal Evaluation - Weekly discussion and Feedback session.
6. Final Review

Semester: X

Subject: Professional Practice and Valuation

Course Code:
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	0	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	--	--	50	25	--	--

Objective:

Develop understanding of building bye laws and its implementation in reference to building design. To develop an understanding of basic professional skills to practice of various type of projects and its complexity.

Content:

BUILDINGY BYE LAWS

1. Zoning of areas: residential, institutional, industrial agricultural entertainment etc
2. Introduction to city, town and village bye laws,
3. Evolution of GDCR (Mumbai municipal act, town planning act and GDCR)
4. Need of bye laws
5. Other prevailing laws (environment law etc)

PROFESSIONAL PRACTICE

1. Role and responsibilities of a professional
2. Prevailing pattern of professional practice
3. Comparison and inter relationship with other professionals and professional bodies
4. Various professional associations and registering body; their responsibilities, detail understanding of professional ethics; fee structure
5. Office organization and management skills
6. Detail understanding of office day to day responsibilities towards staff and other government bodies
7. Understanding of contract and its management, site supervision, Role, responsibilities, liabilities

Methodology:

The lectures will be based on theory, presentations and class assignments. The students will be encouraged to do case studies and construction site visits for the same.

Learning Outcome:

With this, the students will be able to gain knowledge of office organization & management skills, detail understanding of Professional ethics.

Books Recommended:

1. Hand book on professional practice by council of architecture, New Delhi
2. Hand book on professional practice by Indian Institute of Architecture
3. BPMC Act
4. GTP and GDCR rules
5. Professional practice with Elements of Estimating, Valuation contract and
6. Arbitration By Dr. Roshan H. Namavati
7. Estimating and costing in Civil Engineering Theory and Practice by B.N. Datta

E-Sources key words:

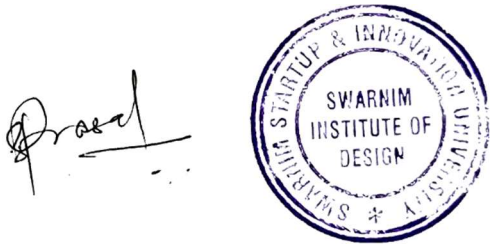
BOS

BACHELORS IN INTERIOR DESIGN

4 Year

2019-2020

Semesters I-VIII
All Semester Details



SYLLABUS - BACHELORS IN INTERIOR DESIGN

4 years Bachelor in Interior Design

Semester I

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33000001	Foundation Studio	14	0	6	8	14
33030101	Interior Material and Construction - I	6	2	2	2	6
33030102	Technical Representation of Drawings - I	4	2	0	2	4
33030103	Humanities	2	2	0	0	2
33000002	Design Communication	2	1	1	0	2
23000007	Introduction to Entrepreneurship	2.5	2	1	0	3

Semester II

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33030201	Design Studio - I	12	0	6	6	12
33030202	Interior Material & Construction - II	6	2	2	2	6
33030203	Technical Representation of Drawings - II	4	2	0	2	4
33030204	Basics of Design	4	2	0	2	4
33030205	History of Interior & Furniture Design - I	2	2	0	0	2
23000013	Preparing Wider Horizon for Entrepreneurship	2.5	2	1	0	3

Semester III

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33030301	Design Studio - II	12	0	2	10	12
33030302	Interior Material & Construction - III	6	2	2	2	6
33030303	Interior Services - I	4	2	0	2	4
33030304	Structure - I	2	1	0	1	2
33040305	Lighting Design	2	0	0	2	2
33040306	History of Interior & Furniture Design - II	2	2	0	0	2
23000014	Entrepreneur Motivation	2.5	2	1	0	3

Semester IV

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33030401	Design Studio - III	12	0	6	6	12
33030402	Interior Material & Construction - IV	6	2	2	2	6
33030403	Interior Services - II	4	2	0	2	4
33030404	Furniture Design - I	2	0	0	2	2
33030405	History of Interior & Furniture Design - III	2	2	0	0	2
33030406	Computer Application - I	2	0	2	0	2
23000017	Project feasibility and marketing skills	2.5	2	1	0	3

Semester V

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33030501	Design Studio- IV	12	0	6	6	12
33030502	Interior Material & Construction - V	6	2	2	2	6
33030503	Interior Services - III	4	2	0	2	4
33030504	Furniture Design - II	2	0	0	2	2
33030505	Landscape in interior design	2	2	0	0	2
33030506	Computer Application - II	2	0	2	0	2
23000020	Scaling up the Venture	2.5	2	1	0	3

Semester VI

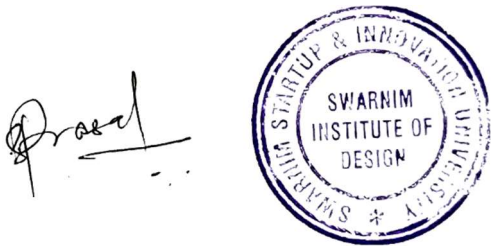
Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33030601	Design Studio - V (Working Drawing)	12	0	6	10	12
33030602	Interior Material & Construction - VI	6	2	2	2	6
33030603	Interior Services - IV	4	2	0	2	4
33030604	Estimation & Costing	2	2	0	0	2
33030605	Computer Application - III	2	0	2	0	2
33040606	Elective - I	2	0	1	1	2
23000021	Idea to Minimum Viable Product	2.5	2	1	0	3

Semester VII

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33030701	Internship/Office training	30	0	0	30	30

Semester VIII

Subject Code	Subject Name	Credit	Teaching Scheme per Week			
			Theoretical	Tutorial	Practical	Total
33030801	Final Project	12	0	0	12	12
33030802	Research Methodologies	12	0	0	12	12
33030803	Interiors in Contemporary Practices	2	2	0	0	2
33030804	Elective - II	2	2	0	0	2
23000024	Managing Innovation & IPR for Entrepreneurs	2	2	0	0	2



SWARRNIM STARTUP AND INNOVATION UNIVERSITY

Bachelors in Interior Design - Semester I-VIII, 2019-20

TEACHING AND EVALUATION SCHEME

Week wise Time table: The subject and the time table are divided week wise. Timetables are created based on subject credits. Teaching and lectures are conducted based on the time table having contact hours of 30 hours per week.

Module Based: Courses conducted in modular format allows students a benefit to go deeper with their studies, skills or research and get continuous support to improve on to each subject. They get more time to focus on every aspect of the subject and the course. They get regular Faculty guidance throughout the module and can plan their activities and assignment without getting affected of any other course.

Course Categories –

Skill/ Workshop

Where faculty members coach students to help them develop skills in working with certain materials and technologies.

- To encourage Interactive and hands-on learning
- To provide sufficient time for skill building;
- To develop practical reasoning and decision making skills.

Studio

Where students are confronted by life-like situations and told to define the problems and to attempt solving them. The faculty coaches students and provides them with necessary concepts and theories.

- To encourage individual but active learning and responsibility
- To facilitate learning to work with group dynamics.

Lecture/ Theory

Lectures are the primary mode of teaching. Best suited for transferring information/concepts/theory. Should be supplemented by frequent tests to verify whether concepts are being understood.

- To deliver substantial amounts of information to student
- To provide a summary or synthesis of information from different sources
- To allow introduction of multiple concepts

Internship

Where a student apprentices in an office or a site to experience what it is like to work in a real-life situation

- To develop that self-confidence of the student

- To expose students to different types of work and comprehensive work experience essential for the independent practice of profession.

Guided Thesis/ Research

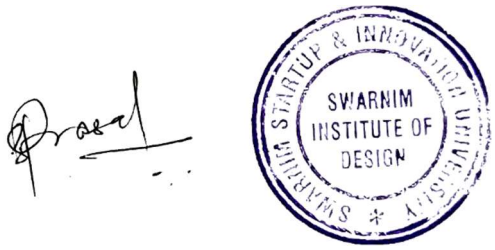
Where faculty members coach individual students on conducting research and writing up the results, undertaking research for a design project and writing up the results or, conducting research for proposing a development project and writing up a grant proposal.

- To equip students with vital research skills.
- To build capacity to develop logical and independent thought process.

Examinations

The Examinations conducted as per the subject criteria. The subjects having external component may have written examination / viva based on the subject details. Studio, workshops and skill based subjects will have critique jury at the end of semester. For Juries, students are required to present and display their real work, prototypes, documentation, explorations etc. done during the semester. Students are evaluated, Judged and guided by field experts of 2 to 4 members as Jury panel. They are given 30 to 45 minutes to speak and discuss in front of the Jury panel regarding their work, learning and improvements during attending the semester courses. The Students who fail to attend Juries as per their Jury Panel decided by the examination committee are subject to fail and repeat the entire Semester or a year.

Skill Course Evaluation Criteria:

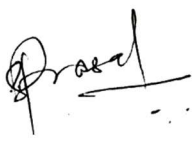


SWARRNIM STARTUP AND INNOVATION UNIVERSITY

INTERIOR DESIGN – COURSE DETAILS

SEMESTER I

Year 2019-20



Semester I

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33000001	Foundation Studio	14	0	6	8	14
2	33030101	Interior Material and Construction - I	6	2	2	2	6
3	33030102	Technical Representation of Drawings – I	4	2	0	2	4
4	33030103	Humanities	2	2	0	0	2
5	33000002	Design Communication	2	1	1	0	2
6	23000007	Introduction to Entrepreneurship	2.5	2	1	0	3
Total			**30.5**	**9**	**10**	**12**	**31**

Subject Name	Examination Pattern									
	Total Credits	Internal				External				Total
		TH	P	PR	P	TH	P	PR	P	
Foundation Studio	14	0	0	50	25	0	0	50	25	100
Interior Material and Construction - I	6	25	12.5	25	12.5	50	25	0	0	100
Technical Representation of Drawings	4	0	0	50	25	50	25	0	0	100
Humanities	2	50	25	0	0	50	25	0	0	100
Design Communication	2	0	0	50	25	0	0	50	25	100
Introduction to Entrepreneurship	3	0	0	50	25	0	0	50	25	100
Total	**31**	**75**		**225**		**150**		**150**		**600**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

SWARNIM STARTUP & INNOVATION UNIVERSITY
SWARNIM INSTITUTE OF DESIGN

Semester: I

Subject: Foundation Studio

Course Code: 33000001

Credits: 14

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	6	8	14

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Relevance:

This course helps develop a quality of keen observation and experience space in terms of perspective. Sharpen the ability to analyze and appreciate the structure that is either visible or hidden, understanding the underlying principles of design, develop fundamental and expert skills required for design representation in 2D and 3D. Helps establish sense of inter-relatedness of parts in overall proportion, colour, and composition to develop a sense of aesthetics.

Objective:

1. To observe and represent images, ideas, concepts and ability.
2. To develop an ability to visualize and articulate one's thinking process.
3. To improve coordination of eye and hand
4. Seek out, observe and analyze occurrences of Geometry in the world

Content:

1. Understanding visual perception of forms analyzed through spatial elements like, line, plane and volume through graphic tools using 2D and 3D explorations.
2. Design principles- Principles of organization & composition , Scale, Proportion, Dimensions, Light, Vision, Perception, Volumes, Materials, Textures
3. Freehand Sketching & drawing representation techniques – Perspectives, Isometric views, humans, Imaginative drawing etc.
4. Gestalt theory using elements of design
5. Science & Concept of colour and colour wheel. Colour perception and human responses, colour in design principles. Colour interaction as a phenomenon, Colour and Form relationship
6. Using elements of design to understand order in space and form, Variation, issues of geometry, principles of perception, proximity, and closure similarity form in content, figure and ground relationships, etc.
7. Relationship between plane and form – Developing 3D solids, Origami etc.

Methodology:

1. Concepts through lectures and demonstrations.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Group presentations, discussions and critiques.

Learning Outcome:

Students will learn the Basics of Drawing with Observation to nature and form. At the end of this course they should be able represent their ideas on paper constructively.

Book Recommended:

1. Form, Space and Order – D.K.Ching
2. Elements of Space Making- Yatin Pandya
3. Operative Design: A Catalogue of Spatial Verbs- Mari, Anthony Di
4. Conditional Design: An Introduction to Elemental Architecture- Mari, Anthony Di
5. Thinking Visually for Illustrators – Mark Vigan
6. Design as Art – Bruno Manarai
7. Geometry of Design: Studies in Proportion and Composition – Kimberly Elam
8. Universal Principles of Design

E-Sources key words:

Semester: I

Subject: Interior Material and Construction - I

Course Code: 33030101

Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	2	6

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
25	12.5	25	12.5	50	25	0	0

Relevance:

An important part of interior design is the specification of suitable materials for the various components that make up a particular interior space. Using environmentally preferable interior materials is an important issue, to reduce the flow of non-renewable resources into interior materials and pollutants from interior materials throughout life cycle of interior materials.

Objective:

1. To get acquainted with basic building materials
2. To understand basic building materials and construction techniques
3. To learn regarding various natural building materials, its origins, manufacturing, construction techniques

Content:

1. Introduction of materials – their physical and behavioural properties, methods, tools of application, different construction technique and criteria for selection of material based on design etc.
2. Understanding of construction fundamentals of all natural building construction materials: Eg. Mud, Brick, Stone, and Bamboo.
    a. Visual quality of all the materials in terms of texture, colour and patterns.
    b. Material strength, longevity, maintenance
    c. Material processing
3. Construction Techniques based on the material (learning through doing)
4. Rational choice for material selection – parameters of design aspects of using various materials in construction of different elements of construction system in relation to the properties of materials.
5. Study of different building elements, structure and their behaviour.

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SWARNIM INSTITUTE OF DESIGN

Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Case Studies
6. Industrial Visits
7. Market Surveys

Book Recommended:

1. Building Construction, W.B. Mckay
2. Building Material and Construction, B.C. Punamia
3. Building Materials, S.K. Duggal
4. The Art of Earth Architecture: Past, Present, Future, Jean Dethier
5. Building with Bamboo: A Handbook: Janssen, Jules J.A.
6. The Art of Natural Building: Design, Construction, Resource by Joseph E. Kennedy (Editor), Michael G. Smith (Editor), Catherine Wanek (Editor)'
7. House of Earth: A complete handbook for earthen construction, Conrad Rouge
8. House, Form and Culture, Amos Rappoport

E-Sources key words:

Semester: I

Subject: Technical Representation of Drawings - I

Course Code: 33030102

Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	50	25	0	0

Relevance:

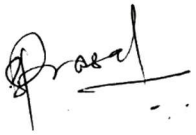
Creating technical drawings is one of the fundamental skills required for an interior designer. Learning to create accurate technical drawings as well as various representation techniques to create visually appealing drawings is the fundamental objective of this subject. The subject will help student to improve their drawing skill and abilities, and improve different techniques of various methods of drawing. Students will lean the ability to communicate through drawings.

Objective:

Developing Drawing skill as tools for design thinking and expression. To help students and understand the techniques of various methods of drawing.

Content:

1. Familiarization of equipment and recapitulation: Ability to handle and use various drawing instruments and media for technical drawing as representation techniques
2. Line types; meaning and application, lettering , use of various metric scales, conventions ,standard annotations and format
3. Lettering: single stroke, double stroke, vertical/ inclined, capital letters, and inclined letters. Dimensioning.
4. Understanding scales: study of scales, their use in practice and construction of plain and diagonal scale. Concept of enlargement and reduction of objects.
5. Understanding of geometrical drawing, Orthogonal projection, projection of lines, planes and solids, section of primary solids such as pyramid, cones, cylinder, prism, sphere, cuboids, etc.
6. Development of geometric objects and their surface development. Model making using two dimensional materials like paper etc.
7. Various representation techniques using various mediums to represent various interior, architectural and natural elements



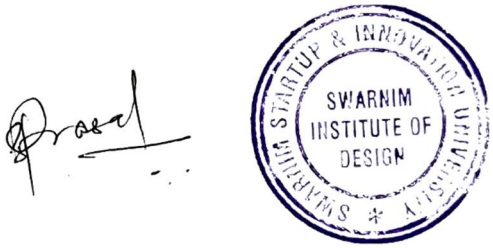
Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio hands on
3. Hand Drafted and Hand Crafted assignments
4. Practical assignments both at an individual and group level.

Book Recommended:

1. Design drawing – Francis D.K.Ching (with Steven P. Juroszek)
2. Architectural Graphics – Francis D.K.Ching
3. Interior Graphic Standard – Corky Binggel, Asid.

E-Sources key words:



Semester: I

Subject: Humanities

Course Code: 33030103

Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	0	0	50	25	0	0

Relevance:

To expose the students to the relationship between man and environment world history and to familiarize the students with basic concepts, theories and issues of culture. Understanding of humanity, its culture to form derivation for design-physical manifestation in the contemporary world.

Objective:

Study of Man and his culture to form derivation in the contemporary world, study the formalization of a civilized state through a long collective human experience.

Content:

1. Study the Ancient World through its History, Art, Religion, Culture, anthropology, philosophy, etc. To earmark culture landmark responsible for shaping our surrounding.
2. Introduction of society, basic concept of society-group, community (rural and urban), association, institution.
3. Study of Medieval and Modern times to understand the culture development through the ages.

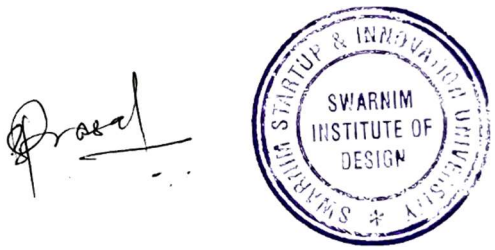
Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Group presentations, discussions, debates and critiques.

Book Recommended:

1. Glimpse of World History
2. Ascent of Man, J.Bronowski
3. Humanities through Eras- Philip Soergel
4. An introduction to Sociology, Vidhya Bhushan and D. R. Sachdeva
5. Indian Society and Culture, Continuity and change by Nadeem Hussain
6. House, Form and Culture, Amos Rappoport

E-Sources key words:



Semester: I

Subject: Design Communication

Course Code: 33000002

Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
1	1	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Relevance:

The University acknowledges English as the primary oral and written language for communication. Design communication refers to the ability of designers to communicate various design concepts, abstract thoughts, design processes etc - clearly, using oral, written, and non-verbal languages.

Objective:

1. Being able to effectively communicate in a simple and understandable manner
2. Sharing ideas and information on design for designers as well as clients
3. Being able to discuss various ongoing concepts tangible as well as intangible, physical as well as abstract.
4. Practicing defending design which will enable them to communicate better during their design juries.

Content:

The course content may contain the following processes, although the design communication content is not limited to the listed content below:

1. Describing Objects
2. Imagining Worlds
3. Describing Design
4. Photo-essays
5. Descriptive Essays
6. Argumentative Essays
7. Designing Games
8. Ideating and creating solutions to various issues
9. Startup ideas

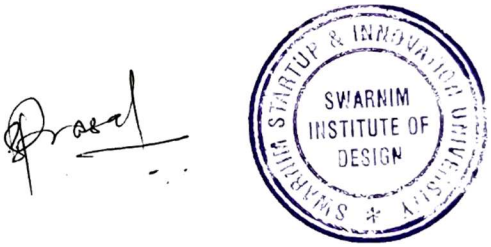
Methodology:

1. Concepts through lectures, various digital mediums, demonstrations etc.
2. Studio/workshop hands on
3. Experimentation with various mediums
4. Practical assignments both at an individual and group level.
5. Group presentations, discussions, debates and critiques.

Book Recommended:

1. Articulating Design Decisions: Communicate with Stakeholders, Keep Your Sanity, and Deliver the Best User Experience Book by Tom Greever
2. Advanced English Grammar -Martin Hewings
3. English Grammar in Use – Tom Gibbons
4. Oxford Modern English Grammar- Bas Arts

E-Sources key words:

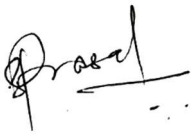


SWARRNIM STARTUP AND INNOVATION UNIVERSITY

INTERIOR DESIGN – COURSE DETAILS

SEMESTER II

Year 2019-20



Semester II

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33030201	Design Studio - I	12	0	6	6	12
2	33030202	Interior Material and Construction - II	6	2	2	2	6
3	33030203	Technical Representation of Drawings - II	4	2	0	2	4
4	33030204	Basics of Design	4	2	0	2	4
5	33030205	History of Interior & Furniture Design - I	2	2	0	0	2
6	23000013	Preparing Wider Horizon for Entrepreneurship	2.5	2	1	0	3
Total			**30.5**	**10**	**9**	**12**	**31**

Examination Pattern

Subject Name	Total Credits	Internal				External				Total
		TH	P	PR	P	TH	P	PR	P	
Design Studio - I	12	0	0	50	25	0	0	50	25	100
Interior Material and Construction -II	6	25	12.5	25	12.5	50	25	0	0	100
Technical Representation of Drawings - II	4	0	0	50	25	50	25	0	0	100
Basics of Design	4	0	0	50	25	0	0	50	25	100
History of Interior & Furniture Design - I	2	0	0	50	25	50	25	0	0	100
Preparing Wider Horizon for Entrepreneurship	2.5	0	0	50	25	0	0	50	25	100
Total	**30.5**	**25**		**275**		**150**		**150**		**600**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

Semester: II

Subject: Design Studio – II

Course Code: 33030201

Credits: 12

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	6	6	12

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Relevance:

Objective:

1. To understand the application of anthropometry, design principles and various components related with space making.
2. While undertaking the exercise of space making, the main focus will be to identify the functional efficiency and relationship of space by understanding the space through various types of activities taking place in it and its furniture layout.

Using these parameters, students will handle a design program in a small space.

Content:

1. Study and application of anthropometry, ergonomics, basic design principles and elements related with space making.
2. Studying and analysing based on activity mapping, bubble diagrams, sketches, plans, sections, elevations and models.
3. Organization of spaces and relationship between space and activity.
4. Quantitative and qualitative aspects of space through case studies and design exercise. Functional efficiency and qualitative aspects of relation to space.

Methodology:

The objectives will be fulfilled by giving exercises to the students in different contexts, which will be presented in the 2D drawing form.

1. Study anthropometry which will also include dimensions of various activities taking place in everyday life.
2. Man and his basic living activity. Students will measure draw any day-to-day activity, study relative proportions and arrive with a design of (2D) functional usable space.

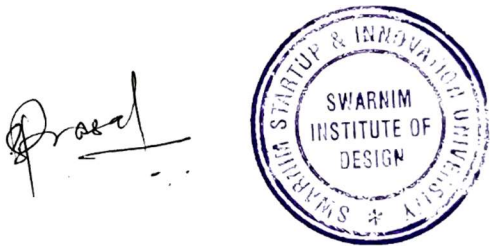
Learning Outcome:

Based on the understanding of the mentioned parameters, design principles and anthropometry, the students will understand the functional analysis of a space, minimum space requirements for an activity to take place and space planning for living activities.

Books Recommended:

1. Alexander, C. (N.D.). A Pattern Language.
2. Ching, D.K., Binggeli, C. (N.D.). Interior Design Illustrated.
3. Panero, J. And Zelnik, M. (2014). Human Dimension and Interior Space. New York: Watson-Guptill.
4. De Chiara, Joseph. (et al). Time-Saver Standards for Interior Design and Space Planning. McGraw Hill International Editions.

E-Sources key words:



Semester: II

Subject: Interior Material and Construction – II

Course Code: 33040202

Credits: 6

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	2	6

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
25	12.5	15	12.5	50	25	0	0

Objective:

To understand basic building and materials and construction techniques for building and composite architecture and to acquaint with brick as a building material.

Content:

1. Introduction to brick – its physical and behavioural properties, methods, tools of application, types of construction technique
2. Understanding of brick as construction fundamentals (as mentioned below) of construction material
    a. Visual quality of all the materials w.r.t. texture, colour and patterns
    b. Material strength, longevity and maintenance
    c. Material processing
3. Construction techniques based on the material (learning through doing).
4. Masonry bonds and construction – their types

Methodology:

Lecture based on theory and class assignments, making drawings, sketches and models. The students will be encouraged to do case studies and industrial site visits for the same.

Learning Outcome:

The students will acquaint themselves with the understanding of brick as a material, its behavioural properties, and different methods and construction techniques.

Book Recommended:

1. Ching, D.K. Illustration of Building and Construction
2. Rangwala S.C. Building Construction
3. Bindra S.P. Building Construction
4. Mackay W.B. Building Construction

E-Sources key words:

Semester: II

Subject: Technical Representation of Drawing - II

Course Code: 33030203

Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	2	4

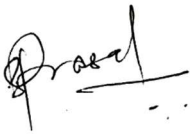
Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	50	25	0	0

Objective:

1. To develop an understanding of technical drawing skill as a tool for design communication.
2. To understand the various techniques and methods of drawing.

Content:

1. Familiarization of equipment and recapitulation: Ability to handle and use drawing instruments and media for technical drawing.
2. Line types: meaning and application, use of various metric scales, conventions, standard annotations and format.
3. Lettering: single stroke, double stroke, vertical/ inclined, capital/ small letters and inclined letters, dimensioning.
4. Understanding scales: study of scales, their use in practice and construction of plain and diagonal scale, concept of enlargement and reduction of objects.
5. Understanding of geometrical drawing, orthogonal projection, projection of lines, planes and solids, section of primary solids such as pyramid, cones, cylinder, prism, sphere, cuboids, etc.
6. Development of geometric objects and their surface development. Model making using two dimensional materials like paper etc.
7. Presentation through isometric and axonometric drawing using model basis.
8. Introduction to perspective drawing: types of perspective drawing, importance and relevance of vanishing point, picture plane and eye level, difference between isometric view and perspective view. Basic one-point and two-point perspective drafting.
9. Understanding of sciography.
10. Geometrical drawing of special and complex curves: Geometrical construction of Sine Curve, Geometrical Mean, Golden Section, Archimedean Spiral, Logarithmic Spiral. Geometrical construction of Ellipse, Parabola, Hyperbola Hyperbolic Paraboloid, Ellipsoid, Elliptic Paraboloid, Hyperboloid – Hypers etc.



Methodology:

Classes will be based on class assignments and drawing exercises.

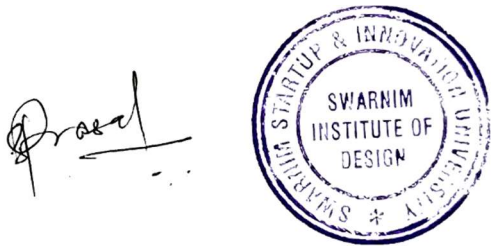
Learning Outcome:

The students will improve their understanding of technical drawing, drawing skill and abilities, and improve different techniques and methods of drawing. Students will learn the ability to communicate through drawings.

Book Recommended:

1. Bhatt, N.D. Engineering Drawing
2. Hoelscher and Springer. Engineering Drawing and Geometry
3. Ching, D.K. Francis, Juroszek, P. Steven. Design Drawing
4. Ching, D.K. Francis. Architectural Graphics
5. Gill, W. Robert. Perspective
6. Binggeli C. Interior Graphic Standard

E-Sources key words:



Semester: II

Subject: Basics of Design

Course Code: 33030204

Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

1. To develop observational and creative skills that would enhance the visual perception of students and evolve aesthetic sensitivity.
2. To develop the perceptions of using the basic principles of aesthetics with the help of various medium, which can be useful in creating a built form.

Content:

1. Exploration of form: organisation and transformation of shapes and form.
2. Exploration of various techniques: translation, aggregation and combination of shapes and forms.
3. The study and application of anthropometry and ergonomics
4. Various Figures - Ground Relationships

Methodology:

The theory lectures will be represented through a series of graphical exercises viz. exploring different media, compositions through models and use of different materials to express the perception.

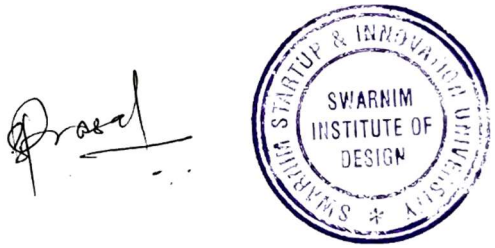
Learning Outcome:

The students will learn how to organise shapes, forms as per basic principles of design, will learn how to transform a shape into a form, or a shape into another shape, or a form into another form. They will also learn how to add, subtract, merge, stack, combine, and intersect different volumes/forms. Along with the shapes and forms, the students will learn the color theory, how to integrate colors with shapes and or forms, how to balance/harmonize colors with shapes/forms.

Book Recommended:

1. Mari, Anthony Di. Operative Design: A Catalogue of Spatial Verbs.
2. Mari, Anthony Di. Conditional Design: An Introduction to Elemental Architecture
3. Heller, Steven. The Graphic Design Idea Book: Inspiration from 50 Masters
4. Barrat, Krome. Logic and Design
5. Ching, D.K. Form, Space and Order
6. Munari, Bruno. Design as Art

E-Sources key words:



Semester: II

Subject: History of Interior and Furniture Design – I

Course Code: 33030205

Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	50	25	0	0

Objective:

To provide students an overview of the history and development of the interior design in the ancient worlds, including the critical social, religion and political events that influenced the field and learning the working vocabulary used to describe interiors, furniture, and decorative arts. Focus Area: Traditional and Vernacular interiors in India.

Content:

1. Introduction and evolution of interior design as a discipline.
2. Understanding the contextual reference (climate, social, religion and political events etc.) in the ancient worlds.
3. Traditional and vernacular notions of space making.
4. Concept of space making craft and the integration with interior design.
5. Applications of space making crafts in traditional and vernacular built forms.
6. Traditional and vernacular elements for space making in the context of India.

Methodology:

Theoretical presentation and group discussions, classwork, assignments and presentations.

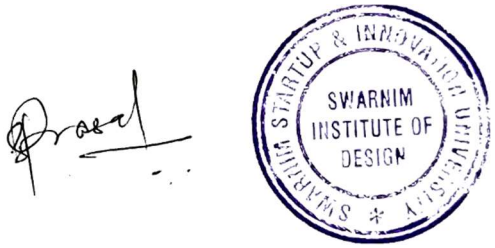
Learning Outcome:

The students will understand the history and development of the interior design in the ancient worlds and the space making in the traditional and vernacular built forms in global and Indian context.

Book Recommended:

1. Ching and Bingel. Interior Design Illustrated
2. Ching, D.K. Form, Space and Order
3. Ching, D.K. A Global History of Architecture.
4. Fletcher, Bannister. History of Architecture. CBS Publisher and Distributors, New Delhi.
5. Jain, Rishav. Crafts in Interior Architecture: India. 1990 Onwards

E-Sources key words:



SWARRNIM STARTUP AND INNOVATION UNIVERSITY

INTERIOR DESIGN – COURSE DETAILS

SEMESTER III

Year 2020-21

Semester III

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33030301	Design Studio - II	12	0	6	6	12
2	33030302	Interior Material & Construction - III	6	2	2	2	6
3	33030303	Interior Services - I	4	2	0	2	4
4	33030304	Structure – I	2	1	0	1	2
5	33030305	Lighting Design	2	0	0	2	2
6	33030306	History of Interior & Furniture Design - II	2	2	0	0	2
7	23000014	Entrepreneurial Motivation	2.5	2	1	0	3
Total			**30.5**	**9**	**9**	**13**	**31**

Examination Pattern

Subject Name	Total Credits	Internal				External				Total
		TH	P	PR	P	TH	P	PR	P	
Design Studio - II	12	0	0	50	25	0	0	50	25	100
Interior Material & Construction - III	6	25	12.5	25	12.5	50	25	0	0	100
Interior Services - I	4	0	0	50	25	50	25	0	0	100
Structure – I	2	50	25	0	0	50	25	0	0	100
Lighting Design	2	0	0	50	25	0	0	50	25	100
History of Interior & Furniture Design - II	2	0	0	50	25	50	25	0	0	100
Entrepreneurial Motivation	2.5	0	0	50	25	0	0	50	25	100
Total	**30.5**	**75**		**275**		**200**		**150**		**700**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

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Semester: III

Subject: Design Studio – III

Course Code: 33030301
Credits: 12

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	6	6	12

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

1. To understand the architectural and interior spaces of a residence.

Content:

1. Design Exercise 1: Mapping of individual spaces, furniture and characteristics of residential spaces
2. Relevant primary and secondary case studies to understand the spatial character through volume, light qualities, circulation patterns etc. The case study will also explore reflection of social, economic and cultural aspects of the programme and context.
3. Design Exercise 2: Residential Design and Furniture Layout
4. Site Plan, Furniture Layout Plan, Flooring Layout, Reflected Ceiling Layout, Electrical Layout, Sectional Elevations, Sketches and study models to describe the modulation of space with respect to function and users.

Methodology:

The objectives will be fulfilled by giving exercises to the students in different contexts, which will be presented in the 2D drawing form.

1. Study anthropometry which will also include dimensions of spaces and activities taking place in everyday life in a residence.
2. Man and his basic living activity. Students will measure draw living spaces in a residence, study relative proportions and arrive with a design of (2D) functional usable space.

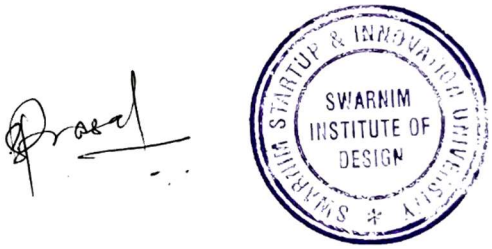
Learning Outcome:

The student will be designing residential architectural and interior spaces with an understanding and usage of contemporary materials, construction techniques and services required for the design project. Study and application of anthropometry, ergonomics and design principles related to the programme will also be reflected.

Books Recommended:

1. Panero, J. and Zelnik, M. (2014). Human dimension and interior space. New York: Watson-Guptill.
2. De Chiara, J. and Crosbie, M. (1989). Time-saver standards for building types. New York: McGraw-Hill.
3. Neufert, E. and Neufert, P. (n.d.). Architect's data. Wiley-Blackwell.
4. Ching, D.K. (n.d.). Form, Space and Order.
5. Mitton, M. (2003). Interior Design Visual Presentation: A Guide to Graphics, Models, and Presentation Techniques. John Wiley and Sons.
6. Mark, K. (1992). Space planning Basics. New York: Van Nostrand Reinhold.

E-Sources key words:



Semester: III

Subject: Interior Material and Construction – III

Course Code: 33030302
Credits: 6

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	2	6

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
25	12.5	25	12.5	80	40	0	0

Objective:

To understand basic building and materials and construction techniques for building and composite architecture and to acquaint with basic building materials such as Timber, Bamboo, Reconstituted wood etc.

Content:

1. Material –timber – classification of trees, characteristics of good timber, sawing methods, tools and techniques of basic timber joinery.
2. Application of timber to openings like doors and windows, Timber panelled, partly panelled and partly glazed and fully glazed doors including hardware, design standards and criteria of opening. Application of timber to partition and panelling.
3. Material –Reconstituted wood, plywood, block boards, particle boards, fibre boards, cement fibre boards etc.- their properties, process of manufacturing, tools and techniques of joinery. Surface finishes to reconstituted wood like laminates, veneer, and other proprietary material.
4. Wall Systems: Brick walls for interior division of spaces and other uses (half brick and one brick thickness). Light weight concrete blocks, hollow blocks, aerated concrete blocks
5. Openings: Teak wood door and window frames, metal composite frames, stone jamb linings, Arches in brick and stone, Lintels
6. Trusses (bamboo & timber) – Types of trusses, components, joinery details & construction methodologies
7. Staircase - Types, components, joinery details & construction methodologies

Methodology:

Lecture based on theory and class assignments, making drawings, sketches and models. The students will be encouraged to do case studies and site visits for the same.

Learning Outcome:

The students will learn the physical and behavioural properties, methods, application and different techniques of timber as a construction and interior material. For all the above mentioned materials a basic understanding of the market research and current trend analysis will be cumulated through case studies.

Book Recommended:

1. Ching, D.K. *Form, Space and Order*
2. Fredrick, Matthew. *101 Thing I Learnt In Architecture*
3. Ching, D.K. *Illustration of Building and Construction*
4. Rangwala S.C. *Building Construction*
5. Bindra S.P. *Building Construction*
6. Mackay W.B. *Building Construction*

E-Sources key words:

Semester: III

Subject: Interior Services - I

Course Code: 33030303
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	2	4

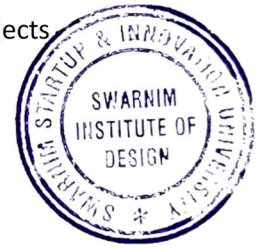
Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	50	25	0	0

Objective:

1. To understand the water supply systems and water drainage systems, also students will learn bathroom design, functions and necessary steps to be taken while designing bathrooms. To also learn the applications of water supply and sanitation in building with exposure to carious fixture and fittings, water supply and sanitary installation at work sites.
2. To understand the various guidelines of fire safety installation and requirements and types of fire safety systems, and the necessary steps to be taken in terms of interior design.

Content:

1. Sources of water supply and method of supply, catchment areas, reservoirs, and their location, control systems, supply for a neighbourhood.
2. Water Treatment Plant – Working of the plant.
3. Understanding of standard of water supply, consumption or demand of water for domestic purposes. Design Layout of Water supply system and Drainage system including calculations for storage units e.g. Underground & Overhead Tanks based on standards. Cold and hot water distribution systems, types of water supply pipes and joints, fixtures and fittings.
4. Bathroom design, fixture, fittings, Flushing systems and accessories. Connection of outdoor drainage systems. Pipes, fittings & fixtures – Materials, size and classification according to BIS. Standard Sanitary fittings & market survey of different fixtures & accessories
5. Principles of drainage, trap type, materials and functions, design of Septic tanks and soak pits and ventilation of house drains. Storm water drains – Details of construction, water entrances, gullies, open drains, gradients, ventilation of drains, rainfall maintenance.
6. Introduction of various systems of sewage and sludge removal and disposal fittings and components of system, layout design. Sewage Treatment Plants – Working of the plant.
7. Connection of house sewers to municipal sewers, sewage disposal scheme for small projects.



8. Mechanism of fire spread in building and prevention. Understanding of fire safety standards and concept of fair protections.
9. Understanding of Fire safety installation and requirements and types of fire safety systems– firefighting provisions, types and applications. Fire retarding materials, fire rated doors etc.
10. Introduction to principles of security, types of security systems and its applications.

Methodology:

Lecture based on theory, presentation and class assignments, making drawings, and sketches. The students will be encouraged to do case studies and industrial site visits for the same.

Learning Outcome:

The students will understand the water supply systems and water drainage systems, also students will learn bathroom design, functions and necessary steps to be taken while designing bathrooms.

The students will also understand the various guidelines of fire safety installation and requirements and types of fire safety systems, and the necessary steps to be taken in terms of interior design.

Book Recommended:

1. Plumbing - By Fred Hall
2. Building Construction Illustrated by Francis D.K.Chig
3. Water Supply & Sanitary Engineering by G. S. Birdie
4. Public Health Engineering by Rangwala
5. Building Services by F. Halls

E-Sources key words:

Semester: III

Subject: Structure - II

Course Code: 33030304
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
1	0	1	1

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	0	0	50	25	0	0

Objective:

Understanding of structure in Interior Design (Conceptual Ideas & Choices)

Content:

1. Necessity of structures in interior design.
2. Basic elements of building: General introduction to various elements of buildings Technical names and functions of various structural components from foundation to roof.
3. Basic supporting system. Types of structure and their behaviour:, introduction to load bearing, framed structure, composite structure and suitability
4. Conceptual Study: Primary and secondary forces acting on structure, gravitational force, live load, wind loads; conceptual idea and their impact on building as a whole, relevant IS Code.
5. Introduction to loads, force and moments on structure.
6. Stability of Structures: How building stand and How they fall.

Methodology:

Lecture based on theory and class assignments, making drawings, sketches and models. The students will be encouraged to do case studies and industrial site visits for the same.

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Learning Outcome:

1. To equip students with the knowledge of structural requirements and latest technology for application.
2. Integrating these technologies with their interior design.
3. Evolving understanding in students to choose appropriate systems.

Book Recommended:

1. Why Buildings stand up, *Mario Salvadori, W. W. Norton & Company; Reissue edition (16 January 1991)*
2. Why Buildings Fall Down – How Structures Fail, *Matthys Levy (Author), Mario Salvadori, W. W. Norton & Company; Reprint edition (1 September 1994)*
3. The Structural Basis of Architecture, *Bjorn N. Sandaker, Arne P. Eggen& Mark R. Cruvellier (Author)*

E-Sources key words:

Semester: III

Subject: Lighting Design - I

Course Code: 33030306
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	0	2	1

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	60	30	0	0	40	20

Objective:

To understand the concept of Light as a design element, it's influence on spaces, psychologically as well as in terms of spatial quality. In depth study of behaviour of light, effect of materials, forms, colors, textures on light and introduction to the concept of day-lighting.

Content:

1. Introduction to the behaviour of light and the phenomena of light
2. Introduction to the concept of Daylight and it's techniques
3. Introduction to Lighting in Interior
    a. The household activities with special reference to light requirement
    b. Cultural and social aspects of lighting
    c. Physiology of vision
4. Quality of Illumination
    a. Colour rendition
    b. Spatial distribution of light: direct, indirect, and diffused
    c. Glare: illuminance contrast, illuminance uniformity
5. Market survey for different materials, accessories & parts (Industry, market & site visits)
6. Making of light sculptures based on all the parameters, such as materials, colors, textures, etc.
7. Learning by doing- Making of the furniture. – Brief , Process, Design, Specification sheets, detailed drawings, prototype & final product

Methodology:

Lecture based on theory and class assignments, making drawings, sketches and models. The students will be encouraged to do case studies and industrial site visits for the same.

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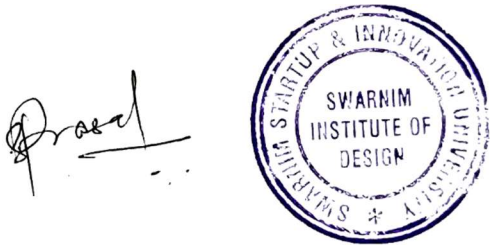
Learning Outcome:

Introduction and knowledge of light as a design element and how to design the most important design element of any space. How to modulate, manipulate, and play with light inside a space as Light is the element, which enables one of the basic senses of humans- Vision and which ultimately hinders our Perception of space and objects around.

Book Recommended:

1. The eyes of the skin: architecture and the senses- Juhani Pallasma
2. Lighting design: a perception-based approach- Christopher Cuttle
3. Designing with light: the art, science and practice of architectural lighting design- Jason Livingston

E-Sources key words:



Semester: III

Subject: History of Interior & Furniture Design II

Course Code: 33030306
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	50	25	0	0

Objective:

To provide students an overview of the history and development of the interior design, including the critical social and political events that influenced the field & learning the working vocabulary used to describe interiors, furniture, and decorative arts. – Focus Area: Historic Interior Design and Furniture (18th century to 20th century)

Content:

1. France in the 18th Century
    a. Louis XIV
    b. Interiors in Rococo Style
    c. The Luxury Market in France in the 18th Century Introduction to the concept of Daylight and its techniques
2. Neoclassicism, French Empire, and English Georgian Styles
    a. Marie Antoinette, Late Neoclassicism, and the fall of the Monarchy
    b. Transitional Style: Post-Revolutionary France & the Directoire
    c. England in the 18th Century
3. The Industrial Revolution and Victorian Style
    a. The Crystal Palace Exhibition
    b. John Lockwood Kipling
    c. The Aesthetic Movement (1860s-1890s)
4. Design Reform in the 19th Century
    a. Lord Leighton House
    b. English Arts and Crafts Movement
5. Fin-de-siècle and Early 20th Century Design
    a. Art Nouveau in France b. Art Nouveau in Belgium

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c. Other European Expressions of Art Nouveau

6. Colonisation and changing form of Interior Design in India

Methodology:

Lecture based on theory and class assignments, making drawings, sketches and models. The students will be encouraged to do case studies and industrial site visits for the same.

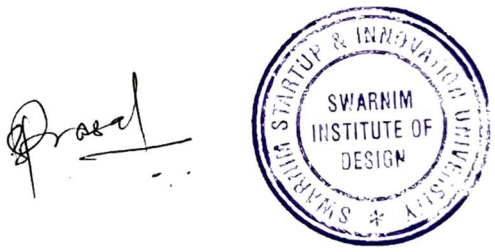
Learning Outcome:

Students will learn about later stage of 20th century art movements and also explore different traditions such as Non- European, Scandinavian and Indian Tradition in detail and also learn about influence of art and culture in all the art movements.

Book Recommended:

1. Interior Design Illustrated – Ching and Bingel
2. History of Architecture, Sir Banister Fletcher, CBS Publisher & Distributors, New Delhi.

E-Sources key words:



SWARRNIM STARTUP AND INNOVATION UNIVERSITY

INTERIOR DESIGN – COURSE DETAILS

SEMESTER IV

Year 2019-20

Semester IV

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33030401	Design Studio - III	12	0	6	6	12
2	33030402	Interior Material & Construction - IV	6	2	2	2	6
3	33030403	Interior Services - II	4	2	0	2	4
4	33030404	Furniture Design - I	2	0	0	2	2
5	33030405	History of Interior & Furniture Design - II	2	2	0	0	2
6	33030406	Computer Application - I	2	0	2	0	2
7	23000017	Project feasibility and marketing skills	2.5	2	1	0	3
Total			**30.5**	**8**	**11**	**12**	**31**

Examination Pattern

Subject Name	Total Credits	Internal				External				Total
		TH	P	PR	P	TH	P	PR	P	
Design Studio - III	12	0	0	50	25	0	0	50	25	100
Interior Material & Construction - IV	6	25	12.5	25	12.5	50	25	0	0	100
Interior Services - II	4	0	0	50	25	50	25	0	0	100
Furniture Design - I	2	0	0	50	25	0	0	50	25	100
History of Interior & Furniture Design - II	2	0	0	50	25	50	250	0	0	100
Computer Application - I	2	0	0	50	25	0	0	50	25	100
Project feasibility and marketing skills	2.5	0	0	50	25	0	0	50	25	100
Total	**30.5**	**25**		**325**		**150**		**200**		**700**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

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Semester: IV

Subject: Design Studio – IV

Course Code: 33030401
Credits: 12

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	6	6	12

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

1. To design a small- scale institution.

Content:

1. Design Exercise: Institution Design
2. Relevant case studies to understand the spatial character through volume, light qualities, circulation patterns etc. The case study will also explore reflection of social, economic and cultural aspects of the programme and context. Division of space, order of space, principles of perception. Services and linkages. Form, function, furniture and space requirements in interiors.
3. Design Process- analysis, area study and interrelationships.
4. Application of understanding for generation of design ideas/concerns/concepts, division of space, order in space, service linkage patterns, movement, etc. in institution design.
5. Site Plan, Furniture Layout Plan, Flooring Layout, Reflected Ceiling Layout, Electrical Layout, Lighting Layout, Services, Sectional Elevations, Sketches and study models to describe the modulation of space with respect to multiple functions and users.
6. Use of elements, material technology, articulation and detailing.

Methodology:

The objectives will be fulfilled by giving exercises to the students in different contexts, which will be presented in the 2D drawing form.

i. Study anthropometry which will also include dimensions of various activities taking place in an institution.

ii. Man and his activities. Students will measure draw any day-to-day activity, study relative proportions and arrive with a design of (2D) functional usable space.

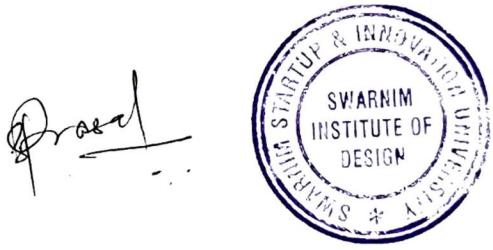
Learning Outcome:

Students will gain an understanding of the nature of spaces, scale, articulation and details for the programme given.

Books Recommended:

1. Panero, J. and Zelnik, M. (2014). *Human dimension and interior space*. New York: Watson-Guptill.
2. De Chiara, J. and Crosbie, M. (1989). *Time-saver standards for building types*. New York: McGraw-Hill.
3. Neufert, E. and Neufert, P. (n.d.). *Architect's data*. Wiley-Blackwell.
4. Ching, D.K. (n.d.). *Form, Space and Order.*
5. Ching, D.K. (n.d.). *Interior Design Illustrated.*
6. Ruskin, E. (n.d.). *Architecture: Scale and proportion.*

E-Sources key words:



Semester: IV

Subject: Interior Material and Construction – IV

Course Code: 33030402
Credits: 6

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	2	6

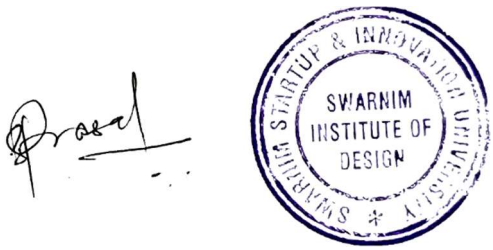
Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
25	12.5	25	12.5	50	25	0	0

Objective:

In this semester students will learn detail study of all the materials and advanced techniques of the same. And also students will learn in detail about different interior materials like composite materials, glass, engineered wood, aluminum, fabrics etc. The focus of the semester is learning different types of system uses in ceilings, partitions, wall treatment, flooring, upholstery etc.

Content:

1. Partition Systems: Wooden frame fixed partition with single/double skin, Aluminum frame Partition, Dry wall partition systems
2. Wall treatment: Finishes to walls, wall cladding, design considerations, materials and working. Wet and Dry wall cladding in different materials, Wall panelling in different materials
3. Thermal and acoustical insulation materials, their properties and application. Introduction to PVC, fiber glass and acrylic.
4. Sliding folding partition in metal and glass. Thermal/Acoustical partition and panelling in metal frame finished in various materials.
5. Suspended Ceiling Systems: Introduction to ceiling materials like PoP, gypsum board, PVC, fiber board. Modular ceiling systems in various materials. Integration of different types of services in ceiling design.
6. Raised flooring Systems: Raised floor for commercial spaces and I.T. rooms.
7. Cabinets: Different types of cabinets (modular kitchen, wardrobe etc.)
8. Upholstery – detailing and applications in interior spaces.



Methodology:

Lecture based on theory and class assignments, making drawings, sketches and models. The students will be encouraged to do case studies and site visits for the same.

Learning Outcome:

By the end of this semester students will have a knowledge of all the construction materials in detail and also learn about various construction systems used in contemporary interior design practices.

Book Recommended:

1. Ching, D.K. *Form, Space and Order*
2. Fredrick, Matthew. *101 Thing I Learnt In Architecture*
3. Ching, D.K. *Illustration of Building and Construction*
4. Rangwala S.C. *Building Construction*
5. Bindra S.P. *Building Construction*
6. Mackay W.B. *Building Construction*

E-Sources key words:

Semester: IV

Subject: Interior Services - II

Course Code: 33030403
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	50	25	0	0

Objective:

1. To understand basic principles and working of electricity in an interior space and focusing on electrical systems in various interior applications.
2. To understand basic principles of communication systems.

Content:

1. Illumination standards and artificial lighting design and lighting power density.
2. Different types of illuminations. Study of lighting fixtures and fittings used in interior spaces, special lighting systems for various types of spaces like exhibition, restaurant, discotheques, cafes, outdoor spaces etc.
3. Electrical Services – Power Connection, A.C. & D.C., conduits, distribution board and fuses, Wiring System (concealed & open) fixtures, design of layout and symbols for representation, methods of concealing.
4. Controls type, selection, care, maintenance and economic use, lamp holders, lighting switches, motion sensors.
5. Transformers & Sub Stations, bye- laws pertaining to installations and load of electric supply
6. Communication systems (telephone, fax, EPABX, LAN, wireless etc.) and their layouts and connections, methods of concealing
7. Basic understanding of home automation and its fundamentals. Day light integrated lighting systems, timers and sensors.
8. Understanding use of automation in interior design. Introduction to Integrated Building Management systems (IBMS) various components of IBMS, List of utility, safety and security systems in general; Types of utility, safety and security systems and its installation. Energy management systems and building controls through IBMS.

Methodology:

Lecture based on theory, presentation and class assignments, making drawings, and sketches. The students will be encouraged to do case studies and site visits for the same.

Learning Outcome:

By the end of this semester, the student will have the knowledge of principles of electricity and its applications in an interior space. The students will be able to produce a whole set of electrical drawings.

Book Recommended:

1. Building Construction Illustrated by Francis D.K.Ching
2. Building Construction- By Rangwala 3. Building Construction- By S.P. Bindra
4. The Smart House by James Grayson Trulove

E-Sources key words:

Semester: IV

Subject: Furniture Design – I

Course Code: 33030404
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	0	2	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

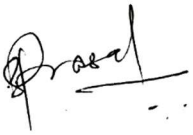
To develop competency for designing, critical thinking and thereby developing furniture forms in relation to human forms to make it functional for various needs generating innovative design ideas.

Content:

1. Introduction to the requirements of the users and the response of the same in terms of Furniture.
2. Studying the ergonomics of the furniture and its impact on human body and scale.
3. "Measure Drawing" furniture, Creating Detailed drawings for furniture– plan, elevation and detail drawing.
4. Introduction to different materials used for furniture: Types of woods- natural & processed, Different types of metals , Finishes for furniture (Varnish, polish, lacquer, melamine, paints, staining, powder coating), Composite & Artificial materials, glass.
5. Properties, Processing of different materials. Market survey for different materials, accessories & parts (Industry, market & site visits)
6. Exploration of various materials and hardware and their use in combination.
7. Learning by doing- Making of the furniture. – Brief, Process, Design, Specification sheets, detailed drawings, prototype & final product.

Methodology:

1. Case studies and literature studies to understand the ergonomics of the furniture.
2. Site visits of furniture industry for better understanding of how a furniture is designed, manufactured, transported and sold.
3. Visits to workshops to get a practical and understand the physical behavior of the materials. It will also help the student understand the joinery between the materials selected.
4. Designing and making actual scale prototype of the furniture.



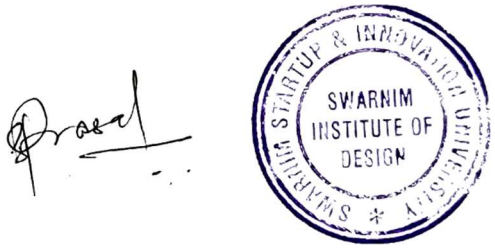
Learning Outcome:

Ergonomics and anthropometry goes hand in hand, when we talk about designing a furniture. Students will learn how to draw a bridge between the two, how to study the human body, their angles, and their movements and design the furniture according to that and the requirements of the user.

Book Recommended:

1. Panero, Julius and Zelnik, Martin. *Human Dimension and Interior Space: A Source Book of Design Reference Standards*
2. Yudina, Anna. *Furnitecture: Furniture that Transforms Space*
3. Lawson, Stuart. *Furniture Design: An Introduction to Development, Materials and Manufacturing*
4. Stuart, Christopher. *DIY Furniture a step by step guide.*

E-Sources key words:



Semester: IV

Subject: History of Interior & Furniture Design – III

Course Code: 33030405
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	50	25	0	0

Objective:

1. To provide students an overview of the history and development of the interior design, including the critical social and political events that influenced the field and learning the working vocabulary used to describe interiors, furniture, and decorative arts.
2. Focus Area: Advent of Modernism in Interior Design practice

Content:

1. Modernism & the Emergence of Interior Design as a Profession
    a. The Chicago School
    b. The Bauhaus (1919-1934)
    c. Marcel Breuer's House in the Museum Garden at MoMA Neoclassicism, French Empire, and English Georgian Styles
2. Art Deco, and Art Brut
3. The Industrial Revolution and Victorian Style
    a. The Crystal Palace Exhibition
    b. John Lockwood Kipling
    c. The Aesthetic Movement (1860s-1890s)
4. Architects and the Chairs
    a. Le Corbusier
    b. Frank Lloyd Wright
    c. Mies van der Rohe
    d. Rem Koolhas e.
    Frank Gehry
    f. Eero Saarinen (etc.)
5. Mid-20th Century Design & Design Today
6. Hans Wegner and Scandinavian Modern

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7. Mid-Century Modern Charles and Ray Eames
8. Design Today
9. Changing Scenario of Interior Design in India – 1947 and onwards
10. Crafts – Contemporary orientations in Interior Design

Methodology:

Lecture based on theory, presentations and class assignments, making drawings, and sketches. The students will be encouraged to do case studies and make presentations for the same.

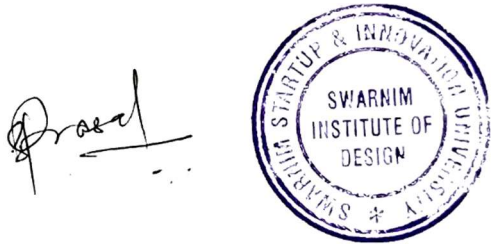
Learning Outcome:

Students will learn about later stage of 20th century art movements and also explore different traditions such as Non-European, Scandinavian and Indian Tradition in detail and also learn about influence of art and culture in all the art movements.

Book Recommended:

1. Interior Design Illustrated – Ching and Bingel
2. History of Architecture, Sir Banister Fletcher, CBS Publisher & Distributors, New Delhi.

E-Sources key words:



Semester: IV

Subject: Computer Application - I

Course Code: 33030406
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	2	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

To learn basics for CAD for 2D drafting.

Content:

1. Understanding basic CAD, i.e. computer aided designing tools, to create necessary design drawings for interior of a space.
2. Introduction to the 2d software, i.e. drafting aids
3. Understanding coordinate system, classification of AutoCAD coordinate system, drafting basic shape with dimension
4. Working with architectural unit system, drawing and modifying simple architectural block.
5. Drafting plan, elevations, sectional views, and component details of residential / commercial building
6. Making a complete interior layout with all furniture and required equipment.

Methodology:

The lectures will be based on presentations and sharing relevant videos of learning the basic software. The students will then be allowed to practice actual drafting of plans, sections and elevations for any space, considering different aspects of interior design.

Learning Outcome:

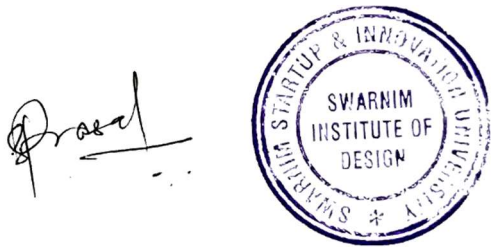
The students will learn how to use software, like pencils/pens as tools and computers, like sketchbooks/cartridges as mediums. Through drafting of spaces on AutoCAD, the students will understand the furniture layout plans in different aspects of interior design.

Book Recommended:

1. Sabot, Gary. High Performance Computing Problem Solving with Parallel and Vector
2. Taylor, Dean. Computer-Aided Design. Reading, MA: Addison-Wesley Publishing Company, 1992.

E-Sources key words:

Relevant web source

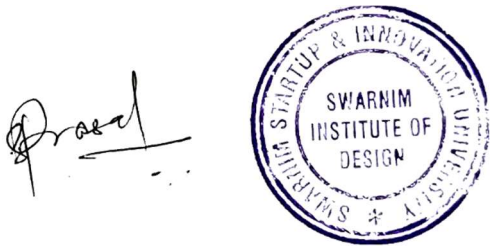


SWARRNIM STARTUP AND INNOVATION UNIVERSITY

INTERIOR DESIGN – COURSE DETAILS

SEMESTER V

Year 2019-20



Semester V

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33030501	Design Studio - IV	12	0	6	6	12
2	33030502	Interior Material and Construction - V	6	2	2	2	6
3	33030503	Interior Services - III	4	2	0	2	4
4	33030504	Furniture Design - II	2	0	0	2	2
5	33030505	Landscape in Interior Design	2	2	0	0	2
6	33030506	Computer Application - II	2	0	2	0	2
7	23000020	Scaling up the Venture	2.5	2	1	0	3
		Total	**30.5**	**8**	**11**	**12**	**31**

Examination Pattern

Subject Name	Total	Internal				External				Total
		TH	P	PR	P	TH	P	PR	P	
Design Studio - IV	12	0	0	50	25	0	0	50	25	100
Interior Material and Construction -V	6	25	12.5	25	12.5	50	25	0	0	100
Interior Services - III	4	0	0	50	25	50	25	0	0	100
Furniture Design - II	2	0	0	50	25	0	0	50	25	100
Landscape in Interior Design	2	0	0	50	25	0	0	50	25	100
Computer Application - II	2	0	0	50	25	0	0	50	25	100
Scaling up the Venture	3	0	0	50	25	0	0	50	25	100
Total	**31**	**25**		**325**		**100**		**250**		**700**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

SWARNIM STARTUP & INNOVATION UNIVERSITY
SWARNIM INSTITUTE OF DESIGN

Semester: V

Subject: Design Studio – V

Course Code: 33030501
Credits: 12

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	6	6	12

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

To understand the designing of a commercial/public space/exhibition space with a technical understanding of drawings, and ergonomics of the space, dimensioning, experimenting with materials, lighting and colour palette. The studio will comprise of two projects of different scales for which the students will be designing. The first being the small project of similar nature to the larger project (e.g. kiosk and restaurant, clinic and hospital etc.)

Content:

1. Introduction to the program, the site and the context and understanding the co-relation between them.
2. Introduction to activity typologies, cultural diversity etc.
3. Design Exercise 1 and 2: Conceptual and design development phase for a medium sized commercial project or public place.
4. Case studies as required for each design exercise.
5. Studying and analysing based on materials and its construction.
6. Drawings, presentations and study models to describe the character of space, interior construction, furniture and furnishings, lighting, colour palettes, materials and finishes.

Methodology:

The studio will be conducted based on selection of site, site visits, site analysis, preparation of presentation and technical drawings, sketches and models. Primary and secondary case studies with respect to the project will be selected by the students and analysed.

Learning Outcome:

Students shall gain knowledge of the commercial/public/exhibition spaces, where the user group is not fixed, but varies as per the usage. This will enable the students to understand and learn how the spaces work when it is not meant specifically for single users, but is based on the functional diversity and typology.

Book Recommended:

1. Panero, J. and Zelnik, M. *Human Dimension and Interior Space: A Source Book of Design Reference Standard.*
2. De Chiara, J. and Crosbie, M. (1989). *Time-Saver Standards for Building Types.* New York: Mcgraw-Hill.
3. Neufert, E. and Neufert, P. (N.D.). *Architect's Data.* Wiley-Blackwell.
4. Hinchman, Mark. *Dictionary of* Interior *Design*
5. Harmon, K. Sharon, Kennon, E. Katherine. *The Codes Guidebook for Interior.*

E-Sources key words:

Semester: V

Subject: Interior Material and Construction – V

Course Code: 33030502
Credits: 6

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	2	6

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
40	20	180	90	80	40	0	0

Objective:

Understanding of glass as an interior material and other advanced construction details and techniques.

Content:

1. RCC as structure material: Technical terms, fundamentals, IS codes, proportions, types, thumb rules, applications
2. Steel as structure material: Technical terms, fundamentals, IS codes, proportions, types, thumb rules, applications
3. Systems RCC & Steel construction details for staircase, walls, beams, columns, foundation, roofing systems
4. Glass as structure material: Technical terms, fundamentals, IS codes, proportions, types, thumb rules, applications
5. Curtain Wall: Components of the Curtain Wall Systems, Support Constructions and Cladding
6. Adhesives classification and types, method of application, bond strength, material and workmanship specifications.

Methodology:

Lecture based on theory and class assignments, making drawings, sketches and models. The students will be encouraged to do case studies and industrial site visits for the same.

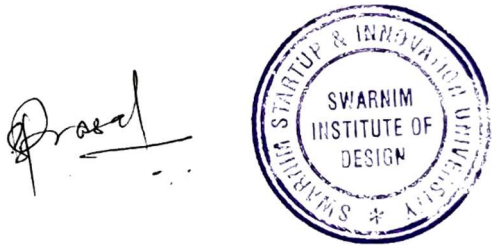
Learning Outcome:

Students will learn advance materials used in present development, their technical drawings and possible usages and details. It will also be a platform for students for doing working drawings in the next semester.

Book Recommended:

1. Ching, D.K. *Illustration of Building and Construction*
2. Rangwala S.C. *Building Construction*
3. Rangwala S.C. *Engineering Materials*
4. Bindra, S.P. *Building Construction*
5. McKay, W.B. *Building Construction*

E-Sources key words:



Semester: V

Subject: Interior Services – III

Course Code: 33030503
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	50	25	0	0

Objective:

To understand the requirement and design of built environment with respect to mechanical services. HVAC, mechanical circulation and automated systems are the topics which will be covered this subject.

Content:

1. Natural ventilation and its importance. Design of openings to achieve comfort.
2. Introduction to fundamental principles of air conditioning. Fluid flow, Heat transfer, psychometrics of air conditioning processes, health and comfort criteria, comfort chart. Selection of indoor and outdoor design conditions. Air conditioning systems, selection of systems, ventilation for cooling.
3. Air cooling systems: passive and evaporative cooling, dessert coolers, ducting and air distribution.
4. Introduction to mechanical ventilation, forced ventilation, types of fans used, simple calculations to decide on the number of fans and their sizes.
5. Air conditioning and mechanical ventilation – Importance of air-conditioning, types of A.C., components of an A.C. system, ducting, layout and design drawings. Window & Split units; variable air-volume, water volume, vapor absorption system (Variable refrigerant Flow). Central Air conditioning systems: AC Plant Room, Direct Expansion and chilled water system, Types of compressors (air cooled and water cooled), Cooling Towers, Air handling units, Fan Coil Unit, sick building syndrome.
6. AC layouts for office spaces-load calculations with details of ducting, application of air conditioning system in hotels hospital and commercial building, ventilation system design for basement, car park, toilet and kitchen ventilation (air washer and scrubbers)
7. Schematic layout for fire protection in building showing exits, escape routes, fire extinguishers (sprinkler systems), tanks and pump room.

8. Different types of mechanical vertical and horizontal movement systems (e.g. Escalators, elevators, travelators). Types and installation provisions of elevators and escalators: passenger lift, hospital (stretcher lift), goods lift, car lifts, dumbwaiters, travelators, step type escalator, belt type escalators, cleat type escalator, levytator etc.
    a. Design considerations: location in a building, serving floor, grouping, lift size, lift car dimensions, door arrangements, waiting time analysis, and sky lobby.
    b. General design, classification and installations of lifts, escalators and travalators. NBC norms and guidelines, capsule lift.

Methodology:

Lectures based on theory and class assignments and making technical drawings. The students will be encouraged to do case studies and industrial site visits for the same and application of concepts in their design project.

Learning Outcome:

The student will understand HVAC and its fundamentals and how HVAC affect interior spaces. The student will also understand air-conditioning systems for various interior applications. Components of air-conditioning, design guide lines.

Book Recommended:

1. Mitchell, W. John, Braun, E. James. (2012). *Heating, Ventilation, and Air Conditioning in buildings*
2. Bangash, M.Y.H., Bangash, T. (2007) *Lifts, Elevators, Escalators and Moving Walkways/ Travelators*

E-Sources key words:

Semester: V

Subject: Furniture Design – II

Course Code: 33030504
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	60	30	0	0	40	20

Objective:

To make furniture as a complete product through the (previously learnt) design processes by adding various layers onto it viz. colors, textures, light, multi-functionality etc.

Content:

1. Furniture as a product: design process and stages, understanding the methods and techniques involved in furniture components.
2. Understanding simple furniture forms like table, chair etc. with respect to its function. Designing furniture forms in relation to each other in a given space.
3. Multiple uses of furniture forms – multi-utility furniture forms for small spaces.
4. Market survey for different materials, accessories and parts (industry, market and site visits). Properties and processing of different materials.
5. Exploration of various materials and hardware and their use in combination.
6. Introduction to modular system of furniture design for various activities.
7. Learning by doing – Making the furniture - Brief, process, design, specification sheets, detailed drawings, prototype and final product.

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Methodology:

1. Case studies and literature studies to understand the ergonomics of the furniture.
2. Site visits of furniture industry for better understanding of how a furniture is designed, manufactured, transported and sold.
3. Visits to workshops to get a practical and understand the physical behavior of the materials. It will also help the student understand the joinery between the materials selected.
4. Designing and making actual scale prototype of the furniture.

Learning Outcome:

By applying the basic understanding of furniture designing, the students will understand the need of different types of furniture, their multiple uses and multi- functionality and change in human ergonomics for different types of furniture. The students will also understand providing better comfort to furniture by using optimum space usage.

Book Recommended:

1. Panero, Julius and Zelnik, Martin. *Human Dimension and Interior Space: A Source Book of Design Reference Standards*
2. Yudina, Anna. *Furnitecture: Furniture that Transforms Space*
3. Lawson, Stuart. *Furniture Design: An Introduction to Development, Materials and Manufacturing*
4. A fine Woodworking Book. *Designing Furniture from Concept to Shop drawing.*
5. Woodworking Books. *Design your own Furniture.*
6. Stuart, Christopher. *DIY Furniture a step by step guide.*

E-Sources key words:

Semester: V

Subject: Landscape in Interior Design

Course Code: 33030505
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

1. To understand the principles of landscape design, types, techniques and application.
2. To understand the ecology, ecosystem, and environmental conservation and the ability of landscape in transformation of the spatial characteristics and make them aesthetically appealing.

Content:

1. Idea and understanding of landscape design: Introduction to the importance of landscape, principles of landscape design and understanding elements of landscape design (interior-exterior and the envelope, characteristics of landscape design elements).
2. Habitation with respect to landscape
3. Components of Landscape:
    a. Natural Landscape
4. Ecology and systems.
    a. Ecology, environment, components, ecosystem at various scales.
5. Land-forms and interdependence (geography-geology)
6. Relation of climate and landscape (natural cycles which shape landscape)
7. Historical and contemporary attitudes to interior landscape
    a. Cultural Landscape
    b. Introduction to Cultural Landscape
    c. Relation of Landscape - Man (Man as a shaper of landscape)
8. Structures in landscapes, water bodies (fountains and ponds etc.), their built form, construction details. Landscape foundations, grading, drainage, paved and unpaved surfaces, roads and paths, their types, natural landforms, retaining walls and slope retention

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9. Study of different types of plants, their characteristics, classification soil suitability, climate, growth, foliage, maturity, diseases and maintenance issues in in various climate type and environment.
10. Services in landscapes and their integration in landscape design viz. water supply, drainage, lighting etc. in interiors, their issues, details and considerations.

Methodology:

1. Lecture series in the form of seminar, presentations.
2. Group studies for identification of plants. Case studies, nursery visits and site visits of the executed projects.
3. Studio design project exercise for application of landscape in desired spaces.

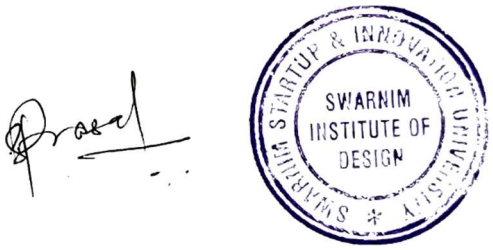
Learning Outcome:

With the help of extensive theory and practical, the students will learn to apply the principles of landscape design using the correct technique in interior and exterior spaces, both.

Book Recommended:

1. Ryan, Thomas. *Detailing for Landscape Architects.*
2. Laurie, Michael. *Introduction to Landscape Architecture.*
3. *Landscape Graphics.* Van Nostrand Publication.
4. *Plan Graphics.* Van Nostrand Publication.
5. Falkenberg, Haike. *Interior Gardens.*
6. Burton, Pamela. *Private Landscapes.*
7. Calicchio, LeFrak Denise. *Rooftop Gardens.*

E-Sources key words:



Semester: V

Subject: Computer Application – II

Course Code: 33030506
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	2	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

To learn to create 3D renderings and walk through for an interior space.

Content:

1. Understanding of basic concepts of 3D modeling
2. Modeling tools , techniques and commands**,** extrusion of solids, solid editing
3. 3D object drawing, construction of 3D models and surface models (mesh and poly modeling of different interior accessories)
4. Working with different architectural materials, placing proper lights in a small interior part.
5. Examples of ray arch and design and photometric light area, linear, isotropic advanced material (mental, spot) with indirect illumination (final gathering)
6. Making a complete interior layout
7. Rendering into Photo Realistic Raster Images of various formats and sizes.

Methodology:

1. Theoretical understanding of the software and its application through presentations.
2. Practical understanding of tools by its application on design or any given space.

Learning Outcome:

The students will learn how to use software, like pencils/pens as tools and computers, like sketchbooks/cartridges as mediums. They'll also be made aware of the current technological advancements in the field, worldwide.

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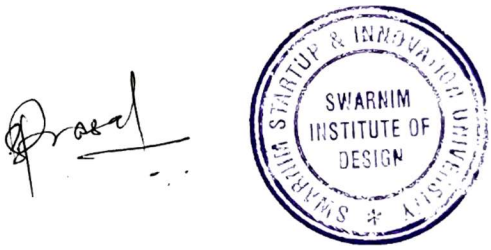
Books Recommended:

E-Sources key words:

1. Web Source



SWARRNIM STARTUP AND INNOVATION UNIVERSITY

INTERIOR DESIGN – COURSE DETAILS

SEMESTER VI

Year 2019-20

Semester VI

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33030601	Design Studio - V	12	0	6	6	12
2	33030602	Interior Material and Construction - VI	6	2	2	2	6
3	33030603	Interior Services - IV	4	2	0	2	4
4	33030604	Estimation & Costing Computer	2	0	0	2	2
5	33030605	Application - III	2	2	0	0	2
6	33030606	Elective - I	2	0	2	0	2
7	23000021	Idea to Minimum Viable Product	2.5	2	1	0	3
	Total		**30.5**	**8**	**11**	**12**	**31**

Examination Pattern

Subject Name	Total	Internal				External				Total
		TH	P	PR	P	TH	P	PR	P	
Design Studio - IV	12	0	0	50	25	0	0	50	25	100
Interior Material and Construction -V	6	25	12.5	25	12.5	50	25	0	0	100
Interior Services - III	4	0	0	50	25	50	25	0	0	100
Furniture Design - II	2	0	0	50	25	0	0	50	25	100
Landscape in Interior Design	2	0	0	50	25	0	0	50	25	100
Computer Application - II	2	0	0	50	25	0	0	50	25	100
Scaling up the Venture	3	0	0	50	25	0	0	50	25	100
Total	**31**	**25**		**325**		**100**		**250**		**700**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

SWARNIM STARTUP & INNOVATION UNIVERSITY
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Semester: VI

Subject: Design Studio – VI

Course Code: 33030601
Credits: 12

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	6	6	12

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

To prepare working drawings and details of a residence/ commercial place/ public place.

Content:

Working Drawing: Residence/ Commercial/ Public place will comprise of the following set of drawings:

a. Developing all floor plans with relevant details with specifications and finishes.
b. Developing wall elevations and relevant sections with materials and finishes and specifications.
c. Generating working drawings of furniture and other relevant components and interior finishes.
d. Integrating services in interiors: electrification, AC, lighting, acoustics etc.
e. Generating views sketch views and perspectives

Methodology:

The studio will be conducted based on technical drawings set of site, plans, elevations, sections, furniture layout, furniture details, services and utilities plan, and model.

Learning Outcome:

Interior architects must be able to communicate their design to contractors. By producing a complete and correct set of working drawings, from plans through details and specifications, students gain an understanding of this process and prepare the documents necessary for the construction phase of the given project. This course helps them augment basic drafting skills to improve communication of their design concepts, and emphasises on facilitating good construction practices through detailing. The

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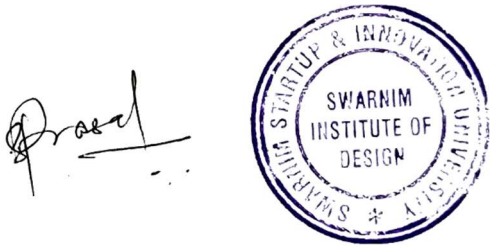
students also learn to find information about building systems and how to detail the primary systems used in interior design.

Book Recommended:

1. Panero, J. and Zelnik, M. *Human Dimension and Interior Space: A Source Book of Design Reference Standard.*
2. De Chiara, J. and Crosbie, M. (1989). *Time-Saver Standards for Building Types.* New York: Mcgraw-Hill.
3. Neufert, E. and Neufert, P. (N.D.). *Architect's Data.* Wiley-Blackwell.
4. Hinchman, Mark. *Dictionary of* Interior *Design*
5. Harmon, K. Sharon, Kennon, E. Katherine. *The Codes Guidebook for Interior.*

E-Sources key words:



Semester: VI

Subject: Interior Material and Construction – VI

Course Code: 33040602
Credits: 6

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	2	2	6

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
40	20	180	90	80	40	0	0

Objective:

Understanding of advanced construction details and smart interior materials.

Content:

1. Restoration and Retrofitting Techniques
2. Waste Management Systems
3. Advanced interior materials
4. Smart interiors

Methodology:

Lecture based on theory and class assignments, presentations, making drawings, sketches and models. The students will be encouraged to do case studies and industrial site visits for the same.

Learning Outcome:

Students will learn advance materials used in present development, their technical drawings and possible usages and details.

Book Recommended:

1. Ching, D.K. *Illustration of Building and Construction*
2. Rangwala S.C. *Building Construction*
3. Rangwala S.C. *Engineering Materials*
4. Bindra, S.P. *Building Construction*
5. McKay, W.B. *Building Construction*

Semester: VI

Subject: Interior Services – IV

Course Code: 33030603
Credits: 4

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	2	4

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	50	25	0	0

Objective:

Understanding sound control as an important element in creating comfortable functional spaces. Learning about fire safety as well as security in an interior space.

Content:

1. Sound -Properties of Sound, room acoustics. Acoustical defects, sound absorbing materials and sound proof construction.
2. Reverberation, Reverberation time for speech and music and its calculation.
3. Thermal insulation and its application. Acoustical requirement of various building type. Acoustics and sound in relation to interior spaces, use of acoustical materials and its properties.
4. Understanding Auditorium design – defects, ways of overcoming these defects.
5. Noise Control: Means and measures for control, noise insulation, and noise control requirements, constructional details and performance.
6. Environmental Noise Control

Methodology:

Lectures based on theory, presentations and class assignments. The students will be encouraged to do case studies and industrial site visits for the same and application of concepts in the given design project.

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Learning Outcome:

The students will gain knowledge of the acoustic services in detail, and how can it be incorporated in their design.

Book Recommended:

1. Environmental Acoustics and Architecture Design, Lehsi L. Dodle
2. Architectural Acoustics, David Egan
3. Design for Good Acoustics, J.E. Moore

E-Sources key words:

Semester: VI

Subject: Estimation & Costing

Course Code: 33030604
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	0	0	50	25	0	0

Objective:

To enable the students to be equipped with knowledge and skills needed such as estimating, costing, analyzing rates and processes of tendering for practicing profession of Interior Architecture.

Content:

1. Introduction to concept of estimation, costing and rate analysis. Need for estimating, costing and rate analysis.
2. Components of estimation, costing and analyzing rates (drawings and specifications, units and modes of measurements, work output, material and labour cost, contingencies, profit margins, indirect costs etc.
3. Methods of estimating (lump-sum, work specific, item rate etc.); costing (percentage basis, item rate basis etc.) and rate analysis (item rate basis). Types of estimates; methods of taking out quantities; financial implications accompaniments of an estimate, Uses of an estimate.
4. Market survey for rates of materials in interior. Current schedule of rates (CSR) of local PWD, mode and units of measurement, General rules for measurement, degree of accuracy.
5. Preparation of schedule of quantities and estimates for basic civil works of brickwork and plaster of buildings.
6. Preparation of schedule of quantities and estimates for plumbing systems and electrical fittings.

Tenders & Tendering Procedures: Introduction, definitions and Tender types. Contents of Tender Document: Undertaking from contractor, prequalification of tender, general and special conditions of tender, bill of quantities, general specifications, material specification, special specification, set of working drawings. Contractual Procedures: Work order letter and acceptance letter, Interim bills and final bills, bills certifications.

Methodology:

Lectures based on theory and presentations, and class assignments. The students will be given a project for them to calculate the quantity and costing of a project.

Learning Outcome:

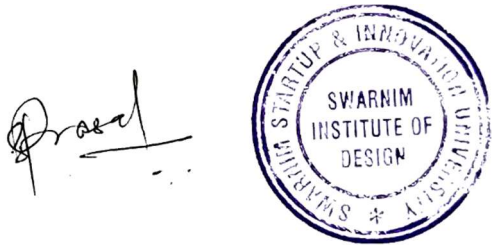
The students will develop the necessary skills in understanding quantities and costs for estimation of basic civil works of buildings and interior works.

Book Recommended:

1. Estimating & Costing in Civil Engineering Theory & Practice", B.N. Dutta, UBS Publishers‟ Distributors Ltd., New Delhi, 1995.

2. Elements of Estimating & Costing, Rangwaala, Publishing House.

E-Sources key words:



Semester: VI

Subject: Computer Application – III

Course Code: 33030605
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	2	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

To enable the students to:

1. Develop understanding of vector drawing and creation of design through vector software.
2. Develop understanding of photo editing and creation of raster images through software.
3. Understanding practical applications of graphic designing.

Content:

1. Introduction to vector based software (like Illustrator, Corel Draw), layout software (InDesign). Introduction to raster based software (Photoshop)
2. Introduction to tools selection and colour models
    a. Working with text
    b. Applying effects
    c. Working with layers and efficient use of software
3. Learning by doing: Creating a portfolio using the introduced softwares.

Methodology:

1. Theoretical understanding of the software and its application through presentations and videos.
2. Practical understanding of tools by its application on design or any given space.

Learning Outcome:

The students will learn how to use softwares, like pencils/pens as tools and computers, like sketchbooks/cartridges as mediums.

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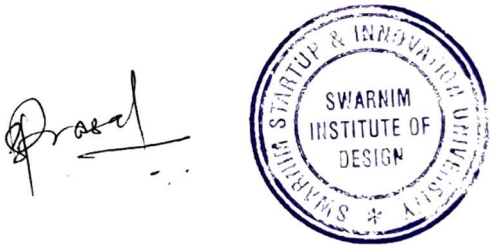
Books Recommended:

E-Sources key words:

1. Web Source



Semester: VI

Subject: Elective - I

Course Code: 33040617
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	1	1	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

The topic for elective courses shall be developed by individual colleges based on the current trends in the practice and availability of resource persons. However, few topics are suggested for the elective in the content section.

Content:

Following are few of the many topics from which the students can select their topics:

1. Energy efficient interior
2. Set Design
3. Product Design
4. Signage & Graphics
5. Interior Photography
6. Interior Journalism

Methodology:

1. Theoretical understanding of the subject through presentations and relevant case studies, and thereafter its application through presentations or drawings.
2. Practical understanding of tools by its application on design and interior spaces.

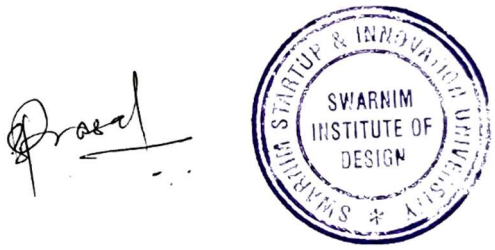
Learning Outcome:

Through electives, the students will understand about the selected topic with respect to interiors. The subjects will also provide students with hands-on practical training respective to materials and tools for the selected subjects and their applications in interiors.

Books Recommended:

E-Sources key words:

1. Relevant Web Sources

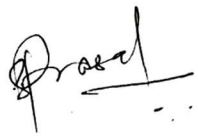


SWARRNIM STARTUP AND INNOVATION UNIVERSITY

INTERIOR DESIGN – COURSE DETAILS

SEMESTER VII

Year 2019-20

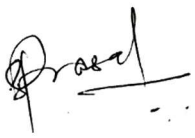


Semester VII

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33030701	Internship/ Office Training	30	0	0	30	30
		Total	**30**	**0**	**0**	**30**	**30**

Subject Name	Examination Pattern									
		Internal				External				
	Total	TH	P	PR	P	TH	P	PR	P	Total
Internship/										
Office Training	30	0	0	50	25	0	0	50	25	1500
Total	**30**	**0**		**50**		**0**		**50**		**100**

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |



Semester: VII

Subject: Internship/ Office Training

Course Code: 33030701
Credits: 30

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	0	30	30

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

To train the students in varied aspects of design focused on interior spaces and provide adequate knowledge of the industry to improve them on a holistic level.

Content:

The Office Training of sixteen week duration envisages varied experience in order to ensure exposure to the student to various tasks in an office. It is up to the student to choose the office and get consent letter by the employer and their details.

The student will be issued a set of log sheets, which has to be filled weekly and authenticate the information with the employer after every four weeks.

The student will submit the log sheet, copies of the drawings prepared, photographs of the work executed on site and the covering letter by the employer at the time of viva date declared by the university.

At the end of the training period, student will have to procure a certificate of training and satisfactory performance from the concerned office in the prescribed format. Certificate of satisfactory completion of training same shall be submitted to the institute.

Learning Outcome:

During the training, the students will gain an adequate knowledge of working in an office to gain experience in varied aspects of design, industry, site works and other miscellaneous work of an office. This will help the students prepare holistically for future design works.

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SWARRNIM STARTUP AND INNOVATION UNIVERSITY

INTERIOR DESIGN – COURSE DETAILS

SEMESTER VIII

Year 2020-21

Semester VIII

Sr. No.	Subject Code	Subject Name	Credit	Teaching Scheme per Week			
				Theoretical	Tutorial	Practical	Total
1	33030801	Final Project	12	0	0	12	12
2	33030802	Research Methodologies	2	2	0	0	2
3	33030803	Interiors in Contemporary Practices	2	2	0	0	2
4	33030804	Elective II	2	2	0	0	2
5	23000022	Managing Innovation & IPR for Entrepreneurs	2.5	2	1	0	3
		Total	**20.5**	**6**	**1**	**12**	**30**

Examination Pattern

Subject Name	Total									
		Internal				External				Total
	Credits	TH	P	PR	P	TH	P	PR	P	
Final Project	12	0	0	50	25	0	0	50	25	100
Research Methodologies	2	50	25	0	0	50	25	0	0	100
Interiors in Contemporary Practices	2	50	25	0	0	50	25	0	0	100
Elective II	2	50	25	0	0	50	25	0	0	100
Managing Innovation & IPR for Entrepreneurs	2.5	0	0	50	25	0	0	50	25	100
Total	**20.5**	150		100		150		100		500

* Theoretical - TH | Tutorial – TU | Practical - PR | Passing - P |

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Semester: VIII

Subject: Final Project - Thesis

Course Code: 33030801
Credits: 12

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
0	0	12	12

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
0	0	50	25	0	0	50	25

Objective:

Each student is expected to prepare a design thesis based on the understanding developed by student under a department approved guide/adviser. The thesis may be a design-oriented project and/ or research topic approved by the department. The thesis should reflect the knowledge gained from the entire course under taken by the student in all the previous semesters.

The proposal must clearly indicate the scope of work, methodology, objectives and case studies. Live projects should be taken up, wherever possible. Periodic submissions must be made for review by the guide and a panel of internal examiners as per the schedule given by the coordinator. The final portfolio must contain comprehensive proposals for the interior supported by drawings, illustrations and models, which will be evaluated by a panel of external examiners. The particulars of schedule, content, presentation, formal, etc., as decided by the department time to time, shall be strictly followed.

At the end of the semester, each student is expected to submit all original drawings or research report prepared as per the department's specifications, three copies of the report in the specified format and a modern should be submitted to the department after obtaining the approval of the respective guide/adviser.

Methodology:

The students will undertake this design project with guidance from a mentor, who is a part of the selected industry. They shall meet their external mentor on a regular basis, who shall guide them and keep track of their progress. Apart from this, they are supposed to be in constant dialogue with their internal mentor from the university, throughout the duration of the semester. The thesis will be divided in the form of reviews at every stage as mentioned below:

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1. Introduction to Thesis Review / Project Work - Explaining concept of approaching a topic of thesis and understanding the importance of subject and its importance.
2. Topic discussion - 1- online - Identifying Topics - minimum 3 topics for discussion. Conducting Individual Discussions with respective faculties.
   Topic discussion - 2 - online - Identifying Topics - minimum 3 topics for discussion. Individual Discussions with respective faculties.
3. Introducing your topic - framing your questions, report writing, preparing mock A4 size portrait document, presenting online to your respective internal guides.
4. Topic discussion - 3 - online- Finalizing topic with valid base material as research.
5. Internal Evaluation - Weekly discussion and Feedback session.
6. Final Review

Book Recommended:

1. How to write your first thesis (Author) Paul Gruba, Justin Zobel
2. How to write a better thesis (Author) David Evans, Paul Gruba, Justin Zobel

E-Sources key words:

1. http://www.cws.illinois.edu/workshop/writers/tips/thesis/
2. https://paperpile.com/g/thesis-introduction/
3. https://www.ldeo.columbia.edu/~martins/sen_sem/thesis_org.html
4. https://cept.ac.in/library/journals-and-periodicals
5. https://ijaahnet.com/

Semester: VIII

Subject: Research Methodology

Course Code: 33030802
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	0	0	50	25	0	0

Objective:

To understand methodological approach to carry out a design or research based programme.

Content:

1. Nature and function of research, scientific research, meaning of research in the field of interior design.
2. Applied research: stages of research and design, design and research methodology.
3. Techniques of data collection
4. Forms of research reporting, structure of a report
5. Writing skills, presentation aids
6. Use of primary and secondary references, bibliography, cross references etc.
7. Nature of an undergraduate thesis, its structure and other requirements.

Methodology:

Lectures will be conducted through presentations, conducting small research projects, and writing short papers.

Learning Outcome:

Through this, the student will understand the role and abilities of research in interior design through research, understanding data, information, and knowledge, and further evaluation, interpretation and presentation of the data.

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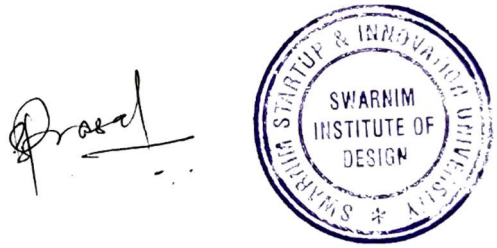
Book Recommended:

1. Inquiry by Design: Environment/ Behavior/ Neuroscience in Architecture, Interiors,
2. Landscape and Planning – John Zeisel
3. Architectural Research Methods – Linda Groat and David Wang
4. The Dissertation – Ian Borden
5. Understanding the Research Process – Paul Oliver
6. A Practical Guide to Graduate Research – Molly Stock
7. Practical Research: Planning and Design – Paul D. Leedy
8. Qualitative Research and Evaluation Methods – Michael Quinn Paton
9. Writing your Thesis – Paul Oliver
10. How to Write a Thesis – Umberto Eco

E-Sources key words:



Semester: VIII

Subject: Interiors in Contemporary Practices

Course Code: 33030803
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	0	0	50	25	0	0

Objective:

To introduce the various facts of architecture and it's influencing factors. To introduce the formal vocabulary of architecture as one of the ways to experience the built environment, To understand and appreciate the universals of architectural form and space in terms of elements and principles within particular historical, cultural and geographic contexts

Content:

1. Origin of Interior Design – Interior Design as a discipline – Definitions of Contemporary Interior Design
2. Contemporary Interior Design: Innovations and Materials
3. Interior Designers of contemporary world
4. Reinterpreting Traditions and vernacular approach to Interior Design
5. Ready- to – assemble furniture
6. Connecting interior design with other design fields

Methodology:

The theory lectures will be based on presentations, class assignments, case studies, analysis and interpretation of interior spaces through works of contemporary designers.

Learning Outcome:

The students will apprehend the contemporary International and Indian practices in the field of interior design. Through this, they will have an understanding of the wide variety of interior works globally.

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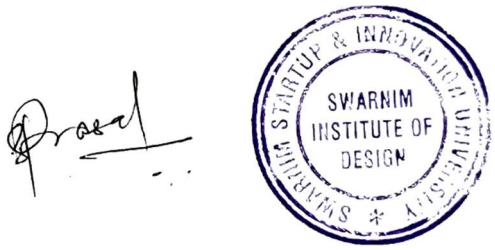
Book Recommended:

1. Parmar V.S., “Design Fundamentals in Architecture”, Somaiya Publications Private Ltd., New Delhi, 1973.
2. Helen Marie Evans and Carla David Dunneshil, “An invitation to design”, Macmillan Publishing Co. Inc., New York, 1982.
3. Yatin Pandya, “Elements of Space making”, Mapin 2007.

E-Sources key words:



Semester: VIII

Subject: Elective - II

Course Code: 33030817
Credits: 2

Teaching Scheme per Week			
Theoretical	Tutorial	Practical	Total
2	0	0	2

Examination Pattern							
Internal				External			
Theoretical	Passing	Practical	Passing	Theoretical	Passing	Practical	Passing
50	25	0	0	0	0	50	25

Objective:

The topic for elective courses shall be developed by individual colleges based on the current trends in the practice and availability of resource persons. However, few topics are suggested for the elective in the content section.

Content:

Following are few of the many topics from which the students can select their topics:

1. Energy efficient interior
2. Set Design
3. Product Design
4. Portfolio Design
5. Interior Photography
6. Interior Journalism

Methodology:

1. Theoretical understanding of the subject through presentations and relevant case studies, and thereafter its application through presentations or drawings.
2. Practical understanding of tools by its application on design and interior spaces.

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Learning Outcome:

Through electives, the students will understand about the selected topic with respect to interiors. The subjects will also provide students with hands-on practical training respective to materials and tools for the selected subjects and their applications in interiors.

Book Recommended:

E-Sources key words:

1. Relevant Web Sources